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RCRA Part B Permit Application for the Idaho National Engineering Laboratory

Volume 5—Radioactive Waste Management Complex

Book 1

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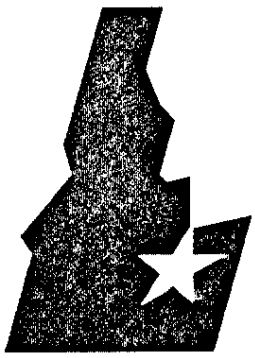

Idaho National Engineering Laboratory

U.S. Department of Energy Idaho Field Office

SECTION C. WASTE CHARACTERISTICS

This section of the Radioactive Waste Management Complex (RWMC) Part B permit application describes the waste characteristics of the transuranic (TRU) mixed wastes at the RWMC waste management units to be permitted: the Intermediate-Level Transuranic Storage Facility (ILTSF) and the Waste Storage Facility (WSF). The ILTSF is used to store radioactive remote-handled (RH) wastes. The WSF will be used to store radioactive contact-handled (CH) wastes.

The Transuranic Storage Area (TSA) was established at the RWMC to provide interim storage of TRU waste. Department of Energy (DOE) Order 5820.2A defines TRU waste as waste contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years in concentrations greater than 100 nanocuries per gram (nCi/g) of waste material. The TSA serves generators both on and off the Idaho National Engineering Laboratory (INEL). The ILTSF is located at the TSA, and the WSF will be located there also.

Most of the wastes managed at the TSA are mixed wastes, which are radioactive wastes regulated under the Atomic Energy Act (AEA) that also contain hazardous materials regulated under the Resource Conservation and Recovery Act (RCRA) and the Idaho Hazardous Waste Management Regulations. These wastes include TRU mixed wastes and some low-level mixed wastes. Accordingly, the TSA is subject to the permitting requirements of RCRA and the Idaho Administrative Procedures Act (IDAPA). Prior to 1982, DOE orders defined TRU wastes as having transuranium radionuclides in concentrations greater than 10 nCi/g. The low-level mixed wastes managed at the TSA are those wastes with 10 to 100 nCi/g of TRU radionuclides that prior to 1982 were considered TRU waste.

The following storage units are at the TSA:

- TSA-1/TSA-R and TSA-2 asphalt-surface, earthen-covered storage pads
- Storage on part of TSA-R covered by plywood and plastic sheeting
- Air-Support Weather Shield (ASWS) storage on part of the TSA-2 asphalt-surface pad
- Certified and Segregated (C&S) air-support building storage on the TSA-3 pad
- ILTSF Pads 1 and 2.

Current plans are that the TSA-1/TSA-R, TSA-2, and TSA-3 waste will be retrieved. Waste can be retrieved directly from the air-support structures on TSA-2 and TSA-3. A retrieval enclosure will be built over TSA-1/TSA-R and part of TSA-2. Once this waste is retrieved, the retrieval enclosure will be modified and permitted for storage in another permit application. The WSF will be constructed as replacement capacity for TSA-1/TSA-R, TSA-2, and TSA-3, and to store newly generated TRU mixed waste received for storage from on- and off-site generators. The WSF will consist of two types of modules (Type I and Type II) and will be permitted for CH mixed waste storage. The mixed waste in storage at ILTSF Pad 1 will be moved to ILTSF Pad 2 and the vaults on Pad 1 will be closed under interim status. The vaults on ILTSF Pad 2 used for RH TRU mixed waste will be permitted. The ILTSF and WSF will also be used to store radioactive (only) waste.

Wastes will be stored in the units to be permitted pending ultimate disposal at the DOE Waste Isolation Pilot Plant (WIPP) or treatment at an appropriate on- or off-site facility.

Information provided in this section pertains only to the RCRA-regulated portions of the TRU mixed wastes and low-level mixed wastes managed at the units to be permitted (WSF and ILTSF). Information on radioactive (only) wastes managed at the TSA, which are not RCRA-regulated, is provided in other INEL documents and in data bases.

Because the RCRA-regulated wastes to be managed at the ILTSF and WSF are mixed wastes, references to radiological and radiochemical data are made throughout this section. Information on radiological and radiochemical characteristics is provided for informational purposes only, as RCRA applies only to the chemical constituents of the mixed wastes.

The wastes managed at the TSA are radioactive at levels which could pose health hazards to RWMC personnel. To control these hazards, the Department of Energy, Idaho Operations Office (DOE-ID), has instituted policies and procedures which minimize container opening at the RWMC. In keeping with these policies and procedures, waste packages are not opened for inspection, sampling, and analysis at the TSA. Instead, a rigorous methodology has been implemented involving the following: characterization by the generator; comprehensive documentation by the generator; and nondestructive inspection, examination, and verification by the RWMC.

The INEL TRU Waste Acceptance Criteria (WAC) for the RWMC, waste handling procedures, and waste data management practices are described in Section C-1. The chemical and physical characteristics of the mixed wastes to be managed at the units to be permitted are described in Section C-2. The sampling, analysis, and examination procedures that will be used to develop the waste characteristics data and ensure safe waste management practices are detailed in the Waste Analysis Plan presented in Section C-3.

C-1 Waste Acceptance, Handling, and Documentation

All of the wastes managed at the ILTSF and WSF are radioactive. The radioactivity of the wastes poses a potential hazard to human health, facilities, and the environment. The mixed wastes managed at these units pose additional potential hazards associated with the chemical constituents of the waste matrices.

To minimize waste-related hazards, the RWMC uses rigorous administrative and engineering controls. Elements of these control systems described in this section of the application include the following: strictly enforced WAC; comprehensive procedures for waste receipt, examination, transfer, and storage; and secured data management and tracking systems. These controls rely extensively on the generators to accurately characterize all RCRA-regulated wastes and to provide for orderly verification and management of waste-related data.

The TRU waste acceptance process at the RWMC involves sequential execution of the following six steps:

1. Waste generators characterize their wastes and transmit appropriate data to the RWMC Waste Generator Interface (WGI) in the form of a Waste Characterization Report. This report is described in detail in Section C-3b as part of the Waste Analysis Plan.

2. The WGI and other RWMC personnel review the Waste Characterization Report and other required and related documents and work with generators to resolve problems and issues.

3. RWMC personnel conduct inspections of the generator facilities as described in Section C-3b(3). This is performed as part of the Waste Analysis Plan.

4. The RWMC, when satisfied that the Waste Characterization Report is true and accurate and that wastes meet the acceptance criteria, issues a letter via the WGI to the generator authorizing shipment of the waste to the RWMC.

5. The generator and RWMC personnel finalize shipment logistics, the generator completes appropriate manifests and shipping papers, and wastes are transported to the RWMC.

6. Waste movements are screened and inspected at the RWMC, as outlined in Section C-3f, before being accepted for storage.

TRU wastes received at the RWMC are destined for the TSA. Low-level (only) wastes received at the RWMC are destined for the Subsurface Disposal Area (SDA). Actual receipt is at the RWMC Administrative Area, and the TRU waste is directed to the TSA. All waste handling and acceptance practices

described in this application are for wastes destined for storage at the TSA (ILTSF or WSF). Thus, the RWMC is the designated area for waste receipt while the TSA is the waste destination and ultimate storage location. When waste already in storage at the TSA is transferred to the WSF, it will be transferred directly as part of the retrieval activities using the procedures described in this application for container handling and transfer.

More details on waste acceptance, handling, and documentation methods used at the RWMC are provided in the following sections. Section C-1a provides information on the WAC. Section C-1b provides details on waste receipt activities. Section C-1c describes waste transfers within the RWMC. Section C-1d is an overview of operations conducted at the Stored Waste Examination Pilot Plant (SWEPP). Section C-1e describes the various data management and tracking systems used at the RWMC to maintain waste characterization and container location information.

C-1a Waste Acceptance Criteria

This section describes the acceptance criteria for newly generated wastes to be stored at the WSF and the ILTSF. Newly generated wastes are defined as wastes received at the RWMC following submittal of this permit application to the Idaho Department of Health and Welfare (IDHW) and the Environmental Protection Agency (EPA) Region X. These acceptance criteria include the INEL TRU WAC [Section C-1a(1)] and the TRU Waste Certification Program [Section C-1a(2)]. Section C-1a(1) also describes the following: waste package marking and labeling requirements, documentation, and receiving inspection programs.

In response to changing regulations, the INEL TRU WAC have undergone changes throughout the more than 20 years of TSA operations. As a result, a significant portion of the waste already in the TSA storage inventory does not conform to all of the current WAC. These wastes do, however, conform to acceptance criteria which were in effect at the time of waste receipt at the

TSA and which provide the necessary level of waste characterization to ensure safe handling and storage of the waste materials.

The WAC that are presently in effect at the RWMC are designed to ensure (1) that wastes are adequately characterized to facilitate eventual treatment and/or disposal at an off-site treatment, storage, or disposal (TSD) facility, and (2) that wastes are safely handled and stored at the TSA. Based on the first item, the INEL TRU WAC are equally or more restrictive than the WAC of planned off-site TSD facilities (e.g., WIPP) to the greatest extent possible.

As previously stated, many of the wastes presently being stored at the TSA do not meet current INEL TRU WAC requirements. However, conditions for shipment to off-site TSD facilities will be identified on an individual waste stream-specific basis as arrangements for off-site treatment and/or disposal are made. Conformance of the waste to off-site TSD facility acceptance criteria will be assessed, as needed, through waste and waste package examination at SWEPP, Argonne National Laboratory-West (ANL-W), or a waste characterization facility to be constructed at the RWMC. In the interim, the waste characterization data in hand are adequate to ensure safe waste management practices and storage at the ILTSF and the WSF.

C-1a(1) INEL Transuranic Waste Acceptance Criteria

The DOE-ID has established acceptance criteria for all TRU waste destined for interim storage at the TSA. These criteria are applied to TRU wastes currently being received at the RWMC for interim storage at the TSA and have been published in the INEL Transuranic Waste Acceptance Criteria, Rev. 5, 1992. This document consists of two parts (Part A and Part B) and is presented in its entirety as Appendix I to this application.

The balance of this section summarizes the INEL TRU WAC. These criteria are presented as discrete sets of requirements for wastes that are certified

for disposal at WIPP (WIPP-certified) and wastes that are not certified for disposal at WIPP (WIPP-noncertified).

The INEL TRU WAC are further delineated within each of the WIPP-certified and WIPP-noncertified categories as described below:

- Contact-Handled (CH) Waste - contains TRU elements in concentrations greater than 100 nCi/g. Radiation readings are less than or equal to 200 mR/h at the waste package surface.
- Remote-Handled (RH) Waste - contains TRU elements in concentrations greater than 100 nCi/g. Radiation readings exceed 200 mR/h at the package surface.

WIPP-Certified Waste

WIPP-certified waste must adhere to the latest revision of the WIPP WAC. Off-site generators of waste volumes greater than 25 $m.^3$ per year are responsible for certifying that each waste container and its contents comply with the WIPP WAC. The SWEPP, located at the TSA, is used to certify INEL-generated waste and waste that has not previously been WIPP-certified by other generators, including generators of less than 25 $m.^3$ waste per year.

The certification process for wastes to be emplaced in the WIPP involves a comprehensive characterization of the waste by the generator, verification by the generator that the waste and its packaging conform to all requirements of the WIPP WAC, and preparation of a written statement signed and dated by the generator attesting to the facts that the waste and packaging fully conform to the WIPP WAC and that the waste is unclassified. The WIPP WAC also requires that each container shall not contain residual free liquids in excess of 1 percent.

Additional requirements have been imposed by the U.S. Environmental Protection Agency (EPA) through the WIPP No Migration Petition Determination issued in November 1990. These requirements include headspace gas sampling of

the container and each bagged package within the container and demonstration that the wastes to be sent to WIPP are the same as those identified in the No Migration Petition.

In addition to WIPP WAC and WIPP No Migration Petition Determination requirements, DOE-ID has applied the following RWMC/TSA site-specific criteria to newly generated waste:

- Radiation levels, as reported by the generator, shall be verified at the RWMC using an ion-chamber, radiation-survey instrument calibrated semi-annually. If measurements disagree significantly, the waste generator will be contacted to resolve the discrepancy.
- Each container and rigid liner shall be vented to allow passage of hydrogen gas.
- Waste packages and fissile material content limits and radiation limits shall be as presented in the INEL TRU WAC (Appendix I to this permit application), Tables 1 and 2 of Part A.
- Each container shall not contain residual free liquids in excess of *1* percent.

These criteria are in the INEL TRU WAC, Section 2.2 of Part A and Sections 2.2 and 2.3 of Part B.

WIPP-Noncertified Waste

A significant quantity of TRU wastes presently in storage at the TSA does not conform to the certification requirements of the WIPP WAC because the wastes were generated prior to the most recent WIPP Waste Acceptance Certification requirements.

Effective September 30, 1987, DOE-ID ceased to accept off-site generated, TRU WIPP-noncertified wastes for storage at the TSA. Presently, only certified CH and certifiable RH wastes are accepted for storage at the TSA. The exceptions are the small-quantity generators (less than 25 $m.^3$ per year)

of CH waste and the various INEL generators. These generators may continue to ship CH waste to the RWMC per the INEL TRU WAC for interim storage at the TSA and subsequent WIPP certification at SWEPP.

INEL has applied the following minimum acceptance criteria to all TRU wastes received for interim storage at the TSA:

- Surface contamination on each waste package shall be less than 1000 dpm/100 cm.^{2} beta-gamma and less than 100 dpm/100 cm.^{2} alpha.
- Radiation levels, as defined in these criteria, shall be verified using an ion-chamber, radiation-survey instrument calibrated semi-annually. Upon receipt of a waste package, the RWMC, as necessary, will verify radiation surveys using an instrument (such as an Eberline Model RO-3A calibrated to ±10 percent) having a 2.5-in.-diameter cylindrical probe. If the readings taken by the waste generator and by the RWMC are significantly different, the waste generator will be contacted to determine the cause of the discrepancy.
- Individual waste packages shall not exceed 1000 Ci of Pu-239 equivalent activity.
- TRU waste shall not be in free-liquid form, and containerization of free liquids is not permitted. However, minor liquid residues remaining in well-drained bottles, cans, or containers are acceptable up to 1 percent by volume at packaging prior to any absorption. Waste packages having a potential for residual liquid shall have an absorbent agent added to ensure immobilization of potential liquid. The proportion for absorbents is twice the manufacturer's recommended ratios. The absorbent shall be placed inside the innermost waste bag or container where the residual liquid is suspect.
- Particulate waste materials shall be stabilized or immobilized. Particulates below 10 microns in diameter at 1 percent by weight or greater and particulates below 200 microns in diameter at 15 percent by weight or greater are prohibited. Materials added to the waste for the purpose of absorbing liquid become part of the waste form and such absorbents must be evaluated as part of the particulates restriction.
- TRU wastes shall contain no hazardous waste materials as defined in 40 CFR 261 unless they exist as product essential co-contaminants.
- No more than 1 percent weight of the waste in each package may be pyrophoric forms of radionuclides (e.g., uranium, plutonium).

- Each container shall be vented to allow passage of hydrogen gas. A carbon composite filter (NucFil) or equivalent shall be used.
- Each waste package shall conform to all requirements specified in Tables 1 and 2 of Part A of the INEL TRU WAC (see Appendix I of this application).

Generators cannot ship wastes to the TSA that contain residual free liquids in excess of *1* percent by volume, as specified by the INEL TRU WAC. Some wastes accepted for storage in prior years exceed the current free-liquid criterion. The RWMC has developed a special plan for managing such materials at the WSF until alternative treatment or disposal facilities become available. This plan is detailed in the Interim Waste Management Strategy for the Waste Storage Facility provided as Appendix II of this application. Mixed wastes stored at the ILTSF as of May 1991 do not contain any residual free liquids; mixed wastes accepted at the ILTSF in the future will conform to the *1* percent residual free-liquids criterion in the INEL TRU WAC.

Waste Packaging, Marking, and Labeling

The INEL TRU WAC include provisions for standard and nonstandard packaging. All waste packages are required to have permanently attached skids, cleats, offsets, rings, handles, chines, or other lifting fixtures to facilitate handling by fork-lift trucks, cranes, or similar equipment. Lifting rings and other auxiliary fixtures on packages must be recessed, offset, hinged, or otherwise engineered so as to not inhibit package stacking. Special rigging required for crane lifts must be installed by the generator before package receipt at the RWMC.

Packages containing TRU wastes received at the RWMC are required to be designed, manufactured, and prepared in full compliance with U.S. Department of Transportation (DOT) regulations promulgated in 49 CFR 173. The DOT regulations seek to enhance safety through four key elements: (1) containment of radioactive material; (2) heat dissipation (if required); (3) shielding from radiation emitted by the material; and (4) prevention of nuclear

criticality. The DOT requirements of 49 CFR 173.441 also set the following radiation limits on all TRU waste shipments:

- In a closed transport vehicle, 1,000 mR/h at 1 m. from the waste package surface
- In a closed transport vehicle, 200 mR/h at any point on the external surface of the vehicle
- 10 mR/h at any point 2 m. from the vertical planes projected by the outer lateral surfaces of the vehicle
- 2 mR/h in any normally occupied position in the vehicle.

To satisfy all RWMC and DOT requirements, the RWMC has established a list of acceptable packagings. Waste packages for newly generated CH waste are as described below:

- DOT Specification 17C 55-gal. drum with a 90-mil high-density polyethylene (HDPE) liner (DOT 7A Type A)
- TRUPAC II standard waste box (up to 55 in. by 71 in. by 37 in. high).

These containers are described further in Tables 1 and 2 of Part A of the INEL TRU WAC (Appendix I to this application) and in Section D-1a(2)(1) of this application.

Other container types present in the current CH waste inventory include:

- DOT 17H 83-gal. salvage/overpack drums
- Wooden boxes
- Fiberglass-reinforced plastic (FRP)-coated wooden boxes
- DOT 6M packaging consisting of DOT 17C 55-gal. drum or 100-gal. drum with fiberboard centering media and a DOT 2R inner containment vessel
- DOT 7A steel bin (M series)

- DOT 7A Steel Box (Sandia Design)
- DOT 7A TX-4 Steel Box.

These containers are described in Section D-1a(2)(1) of this application.

Waste packages for RH mixed waste are as described below:

- DOT 6M packaging consisting of DOT 17C 55-gal. drum or 100-gal. drum with fiberboard centering media and a DOT 2R inner containment vessel
- DOT 17H 30-gal. drum
- DOT 17C 55-gal. drum with a 90-mil HDPE liner
- WIPP canister Type 7A, 120 in. long, 26 in. in diameter, carbon steel, and holds up to three DOT 17C 55-gal. drums.

These containers are described in Sections D-1a(2)(1) and D-1c(2)(1) of this application.

Non-standard DOT-approved containers and special-case waste packages are approved for acceptance by DOE-ID on a case-by-case basis. The approval process is detailed in Section 2.5 of Part B of the INEL TRU WAC (Appendix I to this application).

All waste packages currently being shipped to the RWMC are marked and labeled in compliance with DOT requirements. At a minimum, all waste containers are marked with the DOT proper shipping name, DOT hazard class, and UN/NA number in letters that contrast in color to the container. Hazard Class labels are prominently displayed on at least two sides of the container.

The following RWMC-required information is printed, stenciled, or neatly hand-lettered on each waste package in 1-in. letters:

- "Radioactive Material" and radiation symbol
- Gross weight of the package
- Shipper's unique container identification number. This number is the container identification number recorded on the Transuranic Waste Data Base Input Form, 1D-F-5820.2A, Section One, Spaces 3 through 13. Refer to Section C-1e for details on this form.
- Maximum radiation level at contact with the package surface.

The information listed above is placed on the top and side of each drum. The information is placed on the top center and in the upper right or left quadrant of each of the two longer sides of each box.

Containers holding TRU mixed waste are also labeled in accordance with RCRA. A hazardous waste label, similar to that shown in Exhibit C-1, is affixed to each drum or box. As required under RCRA provisions promulgated in 40 CFR 262.31, the label includes the following information:

- Generator's Name and Address
- Manifest Document Number
- The statement "Hazardous Waste - Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency."

The marking and labeling requirements described above apply to wastes which are currently being received at the RWMC. Some waste packages received in the past are not marked and labeled in complete accordance with these requirements. These packages will be brought into complete accord with the marking and labeling requirements prior to shipment to an on- or off-site TSD facility.

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERATOR INFORMATION:

NAME IDAHO NATIONAL ENGINEERING LABORATORY

ADDRESS C/O EG&G IDAHO, P.O. BOX 1625 PHONE (208) 526-1515

CITY IDAHO FALLS STATE ID ZIP 83415

EPA ID NO. / MANIFEST DOCUMENT NO. ID4890008952 /

ACCUMULATION START DATE

EPA WASTE NO.

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

STYLE WM6P

Printed by LABELMASTER, Div. of AMERICAN LABELMARK CO., CHICAGO, IL 60646 (800) 621-5808

Exhibit C-1. Hazardous Waste Label

C-1a(2) TRU Waste Certification Program

Section 1.1 of Part A of the INEL TRU WAC (Appendix I of this application) requires each waste generator shipping TRU waste to the TSA to have a written Waste Certification Program. The Waste Certification Program must be submitted to the RWMC for approval prior to initiation of waste shipments. It is an administrative control designed to ensure that wastes meet all current WAC.

The Waste Certification Program addresses, defines, and documents the procedures, methods, controls, and activities utilized by the generator to ensure compliance with the INEL TRU WAC.

C-1b Waste Receipt and Off-Loading

Before shipping any wastes to the RWMC, generators must receive a letter authorizing shipment of the wastes. This letter, prepared by the RWMC WGI, contains explicit language which limits the authorization to specific waste descriptions within approved packaging.

Upon receiving an authorization letter, the generator works with a transporter and the RWMC WGI to schedule the shipment and to finalize all logistics. After logistics have been finalized, shipment may proceed. The generator is required to verbally notify the RWMC, prior to waste shipment, of the estimated date and time of waste arrival at the RWMC. The generator is thereafter required to continuously monitor the shipment and report any schedule changes to the WGI immediately.

The RWMC has the capability of receiving wastes by truck and by rail. Generally, shipments are made by truck. Shipments by rail have been made in the past by generators with large waste volumes.

The receipt and off-loading of waste shipments at the RWMC are governed by numerous written directives and procedures. Procedures used to receive and off-load truck and rail car shipments are described in Sections C-1b(1) and C-1b(2), respectively.

C-1b(1) Receiving and Off-Loading Truck Shipments

All waste shipments made by truck to the RWMC must have prior written authorization, as described earlier. Authorized truck shipments enter the RWMC at the RWMC gate house (building WMF-611). Trucks carrying waste are stopped by the security inspectors at the gate house. The inspectors conduct a security inspection of the truck and its contents. The following procedure is then implemented to receive and off-load the shipment:

1. The security inspectors notify RWMC Operations that the waste shipment has arrived.
2. If authorization is verified, the truck is allowed to enter the RWMC gate.
3. RWMC personnel review the shipping papers for completeness and accuracy. Refer to Section C-3f(2) for details.
4. RWMC personnel perform health physics (HP) and industrial safety inspections of the truck and its contents in accordance with established procedures for RWMC receipt, inspection, and documentation of waste. Details on the inspections are also provided in Section C-3f(1), as these are part of the Waste Analysis Plan.
5. Following completion and documentation of the receiving inspections, the waste containers are officially accepted and are then off-loaded in accordance with detailed operating procedures for truck waste container unloading and container discharge to the ILTSF.

Shipments of newly generated CH mixed waste from off-site generators destined for storage at the WSF will undergo waste verification. This is described further in Section C-3f(3)(b).

The procedures for waste receipt, inspection, and documentation assign the following responsibilities to RWMC personnel:

RWMC Waste Engineer

- Maintains auditable documentation with each shipment document package.
- Inspects incoming shipments and records the results on the Receipt Inspection Checklist Form (see Exhibit C-2).
- Examines shipping documentation associated with each waste movement for completeness and accuracy.

Health Physics Personnel and Industrial Safety Engineer

- Ensure that all radiological and safety aspects of each shipment comply with limits established in the INEL TRU WAC.
- Ensure that an HP technician surveys all incoming shipments to verify that the contamination control limits established for RWMC radiation and contamination control are not exceeded. Limits are summarized in Table C-1.

Wastes to be placed in the WSF will remain on the transport truck, which will then be driven from the RWMC Administrative Area to the TSA and into the appropriate WSF module through either the west or east waste access door. The containers will then be unloaded using a forklift. A forklift may also be used to transport the containers into the storage structure (should the truck remain outside the module) and to stack the containers in the appropriate locations.

Wastes that are placed in the ILTSF are normally unloaded from the transport vehicle and emplaced in the vaults using a mobile crane. Both the truck and the crane are moved to the vicinity of the ILTSF vault designated to receive the waste prior to waste unloading. Transport casks are typically used to ship RH TRU waste. These casks provide radiological shielding and physical protection of the waste containers during shipment. To unload the

RECEIPT INSPECTION CHECKLIST

SHIPMENT NUMBER _____ TYPE OF SHIPMENT _____

1. All receipt inspection discrepancies shall be corrected before formally receiving any shipment.

   Record deficiency description(s) and corrective action(s) taken in space provided on page 2 of this checklist.

	NA	CORRECT	DEFICIENT	CORRECTIVE ACTION COMPLETE DATE & INITIAL
A. Tamper Seal correct & intact.	___	_____	_____	_____
B. Incoming contamination & radiation survey (compare to C below)	___	_____	_____	_____
C. ID-F-5480.3	___	_____	_____	_____
D. ID-F-5820.2A	___	_____	_____	_____
E. Certification Statement	___	_____	_____	_____
F. Letter of Exception	___	_____	_____	_____
G. Shipment Corresponds to Documentation	___	_____	_____	_____
H. Shipment Condition	___	_____	_____	_____
I. Package Approved per Waste Acceptance Criteria	___	_____	_____	_____
J. ID F 5820.2 or Equivalent	___	_____	_____	_____
K. TRU nCi/gm	___	_____	_____	_____
L. Storage	___	_____	_____	_____

Exhibit C-2. Receipt Inspection Checklist

	NA	CORRECT	DEFICIENT	CORRECTIVE ACTION COMPLETE DATE & INITIAL
M. Disposal	___	_____	_____	_____
N. Fissile Gram Limit	___	_____	_____	_____
O. Major Nuclide	___	_____	_____	_____
P. Uniform Hazardous Waste Manifest	___	_____	_____	_____
Q. Land Disposal Restriction Form	___	_____	_____	_____
R. Nationwide Capacity Variance Notification	___	_____	_____	_____

2. All Shipments not handled the day of receipt require an additional radiation and contamination survey prior to handling.

3. Whenever a rain storm is forecast or in progress any shipment not immediately placed in the disposal pit will be provided weather protection.

Shipment Accepted by _____ Date _____ Time _____
Waste Engineer

DEFICIENCY DESCRIPTION AND CORRECTIVE ACTION TAKEN

ITEM	Deficiency	Corrective Action

Note: Item 3 above applies only to the SDA and does not apply to the TSA, WSF, or ILTSF.

Exhibit C-2. Receipt Inspection Checklist (continued)

TABLE C-1. RWMC RADIATION AND CONTAMINATION LIMITS

RADIATION/CONTAMINATION PARAMETER	CONTROL LIMIT
Beta-gamma	200 dpm/100 $cm.^2$, 450 pCi/100 $cm.^2$
Alpha	20 dpm/100 $cm.^2$, 50 pCi/100 $cm.^2$
Radiation at Package Surface	200 mR/h (CH) 1000 R/h (RH)

waste, the cask is opened and then the containers are removed by a crane and placed in the vault.

C-1b(2) Receiving and Off-Loading Rail Shipments

Rail shipments are received at the RWMC rail spur. Upon receipt of a rail shipment, RWMC personnel collect and review shipping papers which are located within the individual rail cars. Following completion of the paperwork reviews, HP and industrial safety surveys are conducted. These activities are the same as those described in Section C-1b(1) for receipt, inspection, and documentation of truck shipments.

Any wastes received by rail would be *newly generated* CH waste destined for the WSF. *Such shipments from off-site generators are subject to the waste verification program described in Section C-3f(3)(b).* The containers would be off-loaded from the rail cars to trailers, or flatbed trucks using a crane. The trailers or flatbed trucks would then enter the WSF and the containers would be off-loaded and stacked as described in Section C-1b(1).

C-1c Waste Transfers within the RWMC and TSA

Wastes in storage at the WSF may be routed through SWEPP for certification purposes, to the warming enclosures for thawing prior to SWEPP examination, or, if not vented, to the Drum Vent Facility (DVF) for venting and subsequent aspiration. Containers will be handled by means of a forklift and/or truck. After passing through the warming enclosures, the DVF, or SWEPP, the containers will be placed back in storage at the WSF. SWEPP operations are described in Section C-1d.

Wastes that are presently stored in TSA-1/TSA-R, TSA-2, and TSA-3 will be relocated to the WSF upon retrieval. Wastes in the C&S Building (TSA-3) and in the TSA-2 air-support structure will be moved to the WSF by means of a truck and/or forklift. Wastes that are currently stored in the earthen-

covered pads will be retrieved, relabeled, and overpacked as needed, and then relocated to the WSF by truck. Forklifts will be used to unload containers from the trucks and place them in the modules.

C-1d SWEPP Operations

The SWEPP, located within TSA, is used to examine waste packages presently in the TSA inventory, waste packages generated at the INEL, and waste packages from small generators (less than 25 $m.^3$ of waste per year) for purposes of certifying waste package compliance with the INEL TRU WAC and for certifying wastes for WIPP. The SWEPP facility is also used to periodically examine WIPP-certified wastes shipped to the RWMC from off-site generators to verify the accuracy of generator-furnished data packages and certifications.

The SWEPP facility houses the following five nondestructive examination (NDE) systems:

- Health physics station
- Container weighing
- Real-time radiography
- Container assay
- Container integrity system.

Upon entering the SWEPP facility, waste containers pass through the five NDE systems. The layout of the SWEPP facility is shown in Exhibit C-3. The movement of waste containers through SWEPP is illustrated in Exhibit C-4.

Currently, CH TRU wastes are received, vented if necessary, and placed in temporary storage in the TSA to aspirate radiolytically generated hydrogen gas. From storage, containers are brought to SWEPP for examination and storage classification. When the WSF modules are completed, CH TRU wastes will initially be placed in the Type I or Type II module, vented as necessary, thawed if necessary, then brought to SWEPP. After examination at SWEPP,

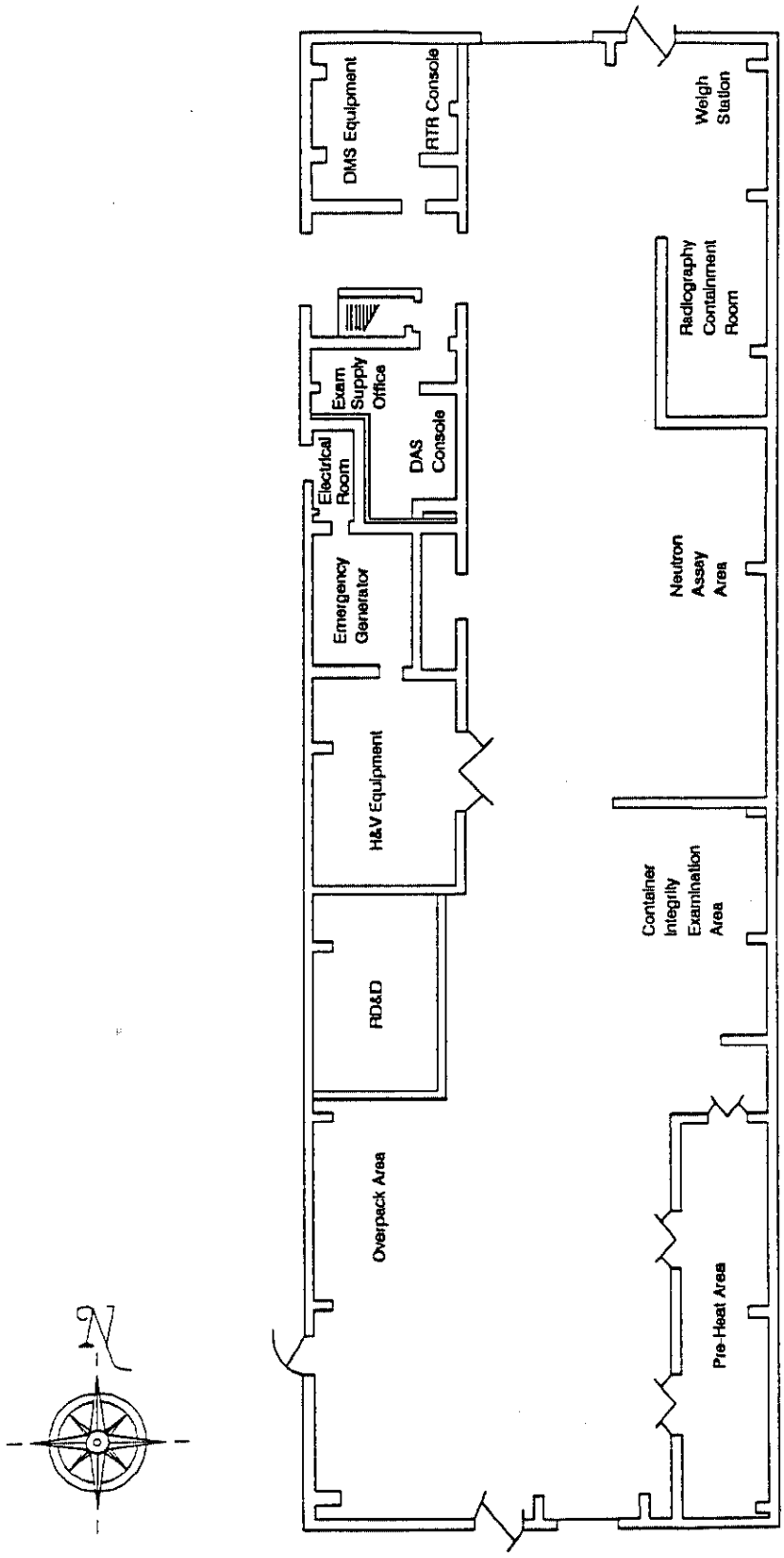

Exhibit C-3. SWEPP Floor Plan

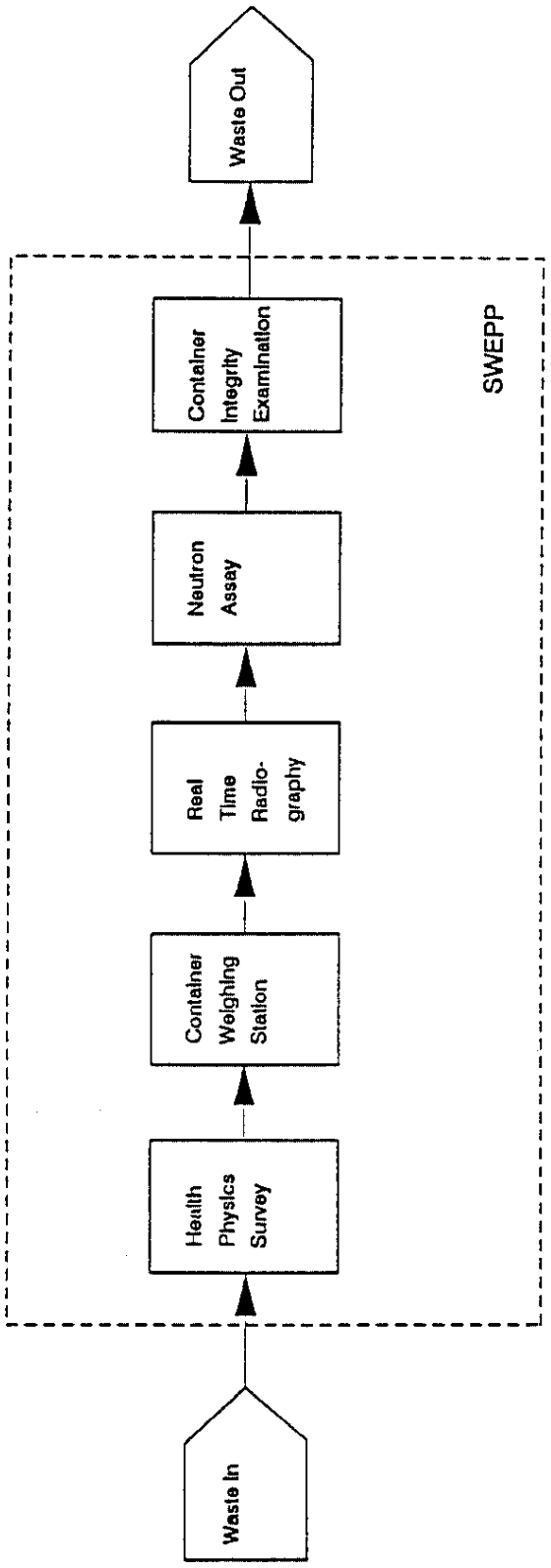

Exhibit C-4. Waste Movement Through SWEPP

containers will be moved to appropriate storage areas within the Type II modules. The planned waste container routes in relation to SWEPP are illustrated in Exhibit C-5.

The SWEPP examination process is used to segregate containers based on their radiological characterization (i.e., TRU or low-level) and to perform certifications for WIPP. SWEPP also has the capability to overpack containers found to not meet container integrity standards.

All information acquired from the remote sensing examinations is monitored and stored by the SWEPP Data Management System (DMS), which is interfaced with the Certified Waste Data Base (CWDB) to allow all data to be automatically included in the overall RWMC data base system.

The first examination point, the health physics station, is used to perform radiation and contamination surveys. The station is equipped with neutron, alpha, and beta-gamma detectors. Results from surveys conducted at the station are used to verify that the radiation and contamination control limits of the INEL TRU WAC are met.

The second examination point, the weigh station, is where each container is identified through its serial number and shipping documentation and a unique bar-code identifier is applied, if necessary. In most cases, bar-code identifiers will be applied before containers enter SWEPP. Existing information concerning the container is then retrieved from the CWDB and a file is created on the DMS. This file is enhanced with the data generated during the examination processes before eventual down-loading back to the CWDB. The weigh station itself consists of a 15,000-lb.-capacity electric scale, bar-code scanner, and computer terminal for data entry. The system's primary function is to weigh containers of waste. Container weights are then used to prepare data packages on INEL-generated wastes or are compared with information provided by other generators in the data packages, shipping papers, and manifests which accompany waste shipments to the RWMC.

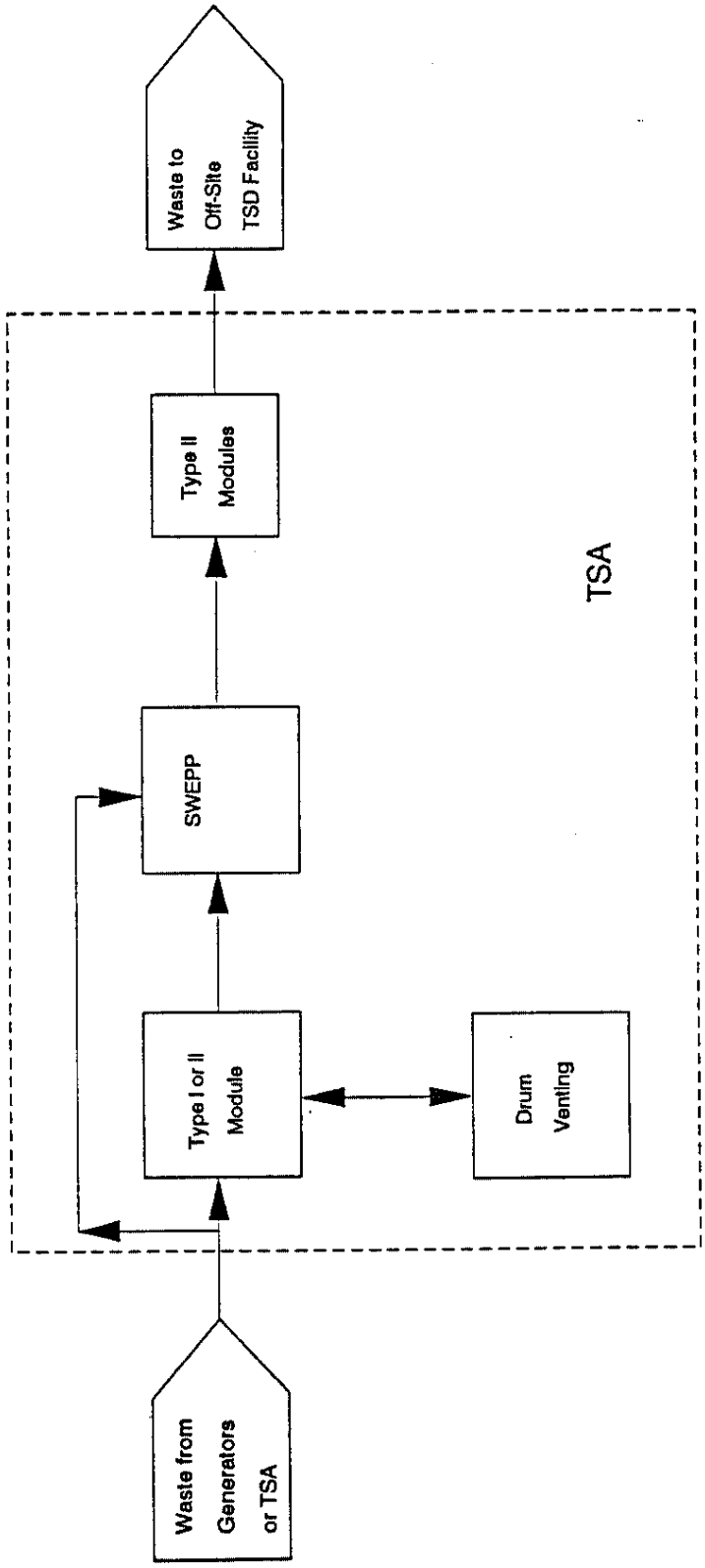

Exhibit C-5. Waste Container Routes

The real-time radiography (RTR) system is the third examination station. It includes X-ray radiography and fluoroscopy equipment which allow container contents to be examined without opening the container. The system is used to identify, characterize, and verify waste materials, forms, shapes, and configurations. The system is also used to identify the presence of free liquids within the waste package and to quantify the volume present. After the container weight and identification have been recorded at the container weighing system, the container is transferred to the transport cart of the RTR system. The cart is mounted on rails and is powered by an electric motor to allow a container to be remotely moved through the RTR shielded room for examination (see Exhibit C-6). Three drums or one box can be handled simultaneously. The RTR system combines X-ray radiography and fluoroscopy to allow examination of the generated image as the examination takes place (i.e., in "real" time). The system consists of an X-ray generation head, a fluoroscopic imaging screen, and a "closed circuit" television camera. The camera image is monitored at the RTR console and recorded by a video cassette recorder. Image processing may also include adding printed data on the video tape. The examination is performed in a lead-shielded containment room for worker safety. The transport cart has the capability to rotate and agitate the containers to ensure the entire waste content is examined. Agitation is used to detect the presence of free liquids that may otherwise not be discernable. The X-ray tube and camera are also equipped with drive motors to allow a vertical scan of the container.

The container assay system, the fourth examination station, is used to determine the amount of TRU nuclides present in a container of waste. The system uses active and passive assay modes to measure and correlate the type and number of neutrons radiated from the container to TRU nuclides. Assay results are used to verify that TRU nuclides present in the waste form are within the ranges allowed by the INEL TRU WAC. Neutron detection is accomplished by detectors located in the walls of the polyethylene chamber. The quantities of TRU nuclides present in the waste are determined by

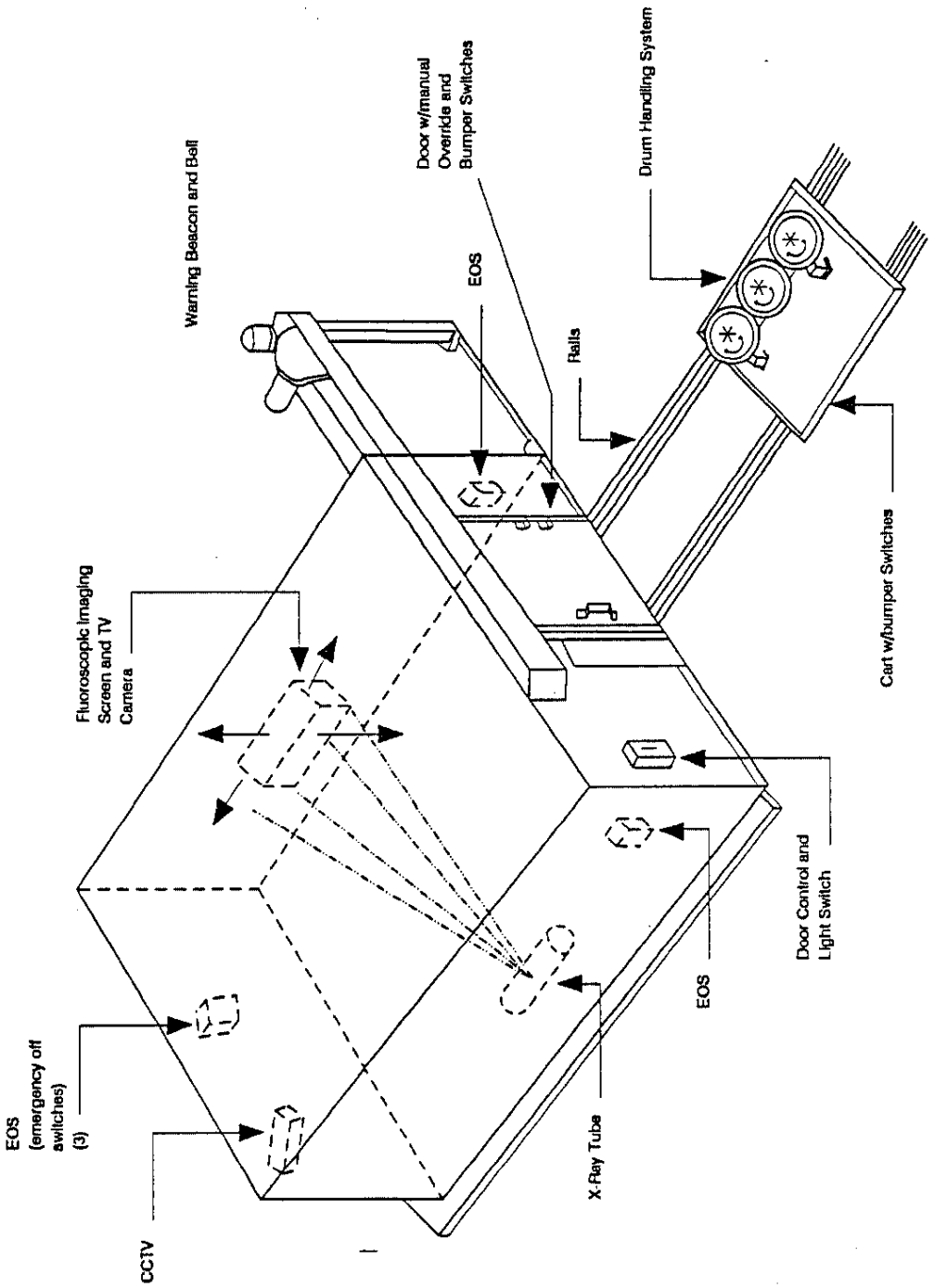

Exhibit C-6. Real-Time Radiography System

comparison of the observed neutron output with algorithms developed for generator-specific waste forms.

The container integrity system (CIS), the fifth and final examination station, consists of an eight-channel multiplexed ultrasonic sensor, a search unit assembly, and a container-rotating fixture that are used to measure the wall thickness of 55-gal. steel drums. The results of the examination are used to verify that the drums meet the wall thickness requirements for DOT Type A containers and the container specifications of the INEL TRU WAC and the WIPP WAC. Drums which fail the CIS examination, but would otherwise be WIPP certifiable, are overpacked in a larger container meeting INEL TRU WAC and DOT specifications to assure waste containment. A hand-held ultrasonic sensor is available to examine metal boxes.

All of the NDE systems are linked to the SWEPP DMS located at the RWMC. The SWEPP DMS is used to collect information relative to containers examined at SWEPP and to build data bases to support decisions regarding eventual waste treatment and disposal at WIPP and other facilities.

C-1e Data Management and Container Tracking Systems

Two principal information management systems are currently used at the RWMC to document and track the waste materials. The INEL Radioactive Waste Management Information System (RWMIS) maintains inventory data for all types of radioactive wastes managed at the INEL (i.e., solid, liquid, gas, mixed). The Transuranic Waste Management Information System (TWMIS) is a data base system dedicated strictly to maintaining records on the TRU radioactive and mixed waste stored at the RWMC on the four TSA pads and the ILTSF vaults. The RWMIS provides overall information on TRU waste volumes and activities, and provides information on container locations, content codes, and other container-specific data. The TWMIS supplements this information by providing additional detailed container-specific information that enhances tracking and analysis of waste forms, contents, and locations. The original INEL TRU waste

data base was referred to as the Transuranic Contaminated Waste Container Information System (TCWCIS) and contained data on TRU containers shipped to the INEL from 1971 to 1983. This data base was converted to the TWMIS format in 1986. The TCWCIS data base was then removed from the computer and placed in tape storage.

There are several data base subsets within the TWMIS including:

- Transuranic Waste Data Base (TWDB): This is the general data storage subsystem. Data are retrieved from this data base and loaded into the SWEPP Data Management System for retrieval or manipulation.
- Certified Waste Data Base/Load Management System (CWDB/LMS): This contains data about WIPP-certified containers to be transferred into the WIPP Waste Information System (WIPP WIS).
- SWEPP Archive (RKIVE): This contains information on each container after completion of the SWEPP process.
- SWEPP Data Management System (SWEPP-DMS): This is a transient data base that receives container data from TWDB and SWEPP and then loads the data into RKIVE.
- SWEPP Tracking System (SWEPP-TRACK): This tracks certified and noncertified waste container locations within the TSA.

The RWMIS is managed by the Environmental Monitoring organization. The TWMIS is managed by the RWMC. Data entry into the RWMIS is the responsibility of the generators. Data validation and reporting of RWMIS information are the responsibilities of Environmental Programs. Data entry, validation, and reporting of TWMIS information are the responsibilities of the RWMC. Waste-related data are entered by the generators directly to the RWMIS before waste shipment to the RWMC, and TRU-related data are entered into the TWDB by RWMC personnel. The data are transmitted using several different forms which include information on the composition and nature of the waste, method of transport, and the generator. Forms required to accompany a waste shipment include:

- U.S. DOE Hazardous Material Shipping Record Form (ID F 5480.3A)
- Stored, Disposed or Processed Solid Radioactive Waste Form (ID F 5820.2) or computer-generated equivalent
- Certified Waste Data Base System Transuranic Data Base Input Form (ID F 5820.2A) or computer-generated equivalent
- INEL TRU WAC Compliance Certification Statement and WIPP WAC Compliance Certification Statement (for WIPP pre-certified containers)
- Uniform Hazardous Waste Manifest (for shipments including mixed waste).

Exhibit C-7 is the U.S. DOE Hazardous Material Shipping Record Form (ID F 5480.3A). Information provided by the generator on this form includes the following: generator name and address, proper DOT shipping name, chemical form, weight, volume, container type, physical form, identity and curie quantity of each principal nuclide, radiation survey results, other required DOT transportation data, and a certification that the information provided is accurate.

Exhibit C-8 is the Stored, Disposed or Processed Solid Radioactive Waste Form (ID F 5820.2). This form or a computer-generated equivalent is used to report to DOE-ID all solid radioactive wastes being stored, disposed of, or processed at the INEL. A separate form is completed for every container of waste. The form provides information on the following: waste origin; gross volume; weight; curie content; container type; contact dose rate; volume percent of combustibles; volume percent of metals; content code; storage, disposal, or processing location; and other waste parameters.

Exhibit C-9 is the Certified Waste Data Base System Transuranic Data Base Input Form (ID F 5820.2A). This form or a computer-generated equivalent is the primary mechanism by which most generators submit information for inclusion in the TWDB. Important parameters common to the TWDB and the Certified Waste Data Base System Transuranic Data Base Input Form are as follows: package identification number, container code, waste package closure

Exhibit C-7. U.S. DOE Hazardous Material Shipping Record
(ID F 5480.3A) (in sheet protector following)

Exhibit C-8. Stored, Disposed or Processed Solid Radioactive Waste Form (ID F 5820.2) (in sheet protector following)

Exhibit C-9. Certified Waste Data Base System Transuranic Data Base Input Form (ID F 5820.2A) (in sheet protector following)

date, seal number, package gross weight, total surface dose rate, content code, primary nuclide and quantity, secondary nuclide and quantity, shipment number, shipment date, organic materials weight, thermal power, Pu-239 fissile gram equivalent, total alpha activity, hazardous material identification codes and quantities, date waste package certified to WIPP criteria, six-pack identification number, TRU PACT/cask number, Pu-239 equivalent activity, neutron dose rate, container weight, and waste form weight. The Rocky Flats Plant in Colorado and the Mound Facility in Ohio have developed the capability to transmit the above data to the TWDB electronically. These two facilities do not use the Certified Waste Data Base System Transuranic Data Base Input Form.

Exhibit C-10 is the INEL TRU WAC Waste Form Compliance Certification statement. This statement is signed and dated by a duly authorized representative of the generator. It attests to the fact that the waste package(s) fully comply with the INEL TRU WAC and that the information is accurate and complete regarding waste characteristics and suspected hazards per RCRA.

Exhibit C-11 is the WIPP Certification of Compliance statement. This statement, signed and dated by a duly authorized representative of the generator, attests to the facts that the waste package and its contents fully comply with the INEL TRU WAC and the WIPP WAC and that the waste is unclassified.

Exhibit C-12 is a typical Uniform Hazardous Waste Manifest. Information on the manifest includes the generator's name and mailing address, generator's U.S. EPA identification number, manifest document number, transporter's name and U.S. EPA identification number, the designated facility name and address (in this case EG&G Idaho, Inc., at the RWMC), the quantity, proper DOT shipping name, DOT hazard class, UN/NA ID number, and EPA waste number of each waste type; and the numbers and types of containers. This includes a

INEL TRU WAC WASTE FORM COMPLIANCE CERTIFICATION

I hereby certify that I have personally examined and I am familiar with the information submitted in this and all attached documents. Based on my inquiry of those individuals immediately responsible for obtaining the information, *and* to the best of my knowledge and ability, I believe that the submitted information is true, accurate, complete, and that all known waste form characteristics and suspected hazards have been disclosed.

CAUTION

The knowing and willful recording of false, fictitious, or fraudulent statements or entries on this document may be punishable as a felony under federal statutes [e.g., Section 3008(d)(3) of the RCRA].

I certify that this waste form meets all requirements of the INEL *TRU WAC* (DOE/ID-10074).

Date *Title* *Waste Generator Manager Signature*

Telephone: _____

Address: _____

_____

_____

_____

_____

_____

a. Must be signed by supervisory personnel cognizant of TRU-WAC criteria requirements. This person's signature verifies (based on personal observation, certified procedures and records, and direct reports from workers) and certifies that the waste form are in accordance with the specified requirements.

Exhibit C-10. INEL TRU WAC Waste Form Compliance Certification

WIPP CERTIFICATION OF COMPLIANCE

I do hereby certify to the Waste Management Programs Division - RWMC Operations Branch, EG&G Idaho, Inc., that the packaging and container contents of the waste packages listed below meet the acceptance criteria in accordance with the requirements of WIPP-DOE-069 and DOE/ID-10074, Latest Revision, prior to its shipment. All waste is unclassified.

CONTAINER NUMBER	PREFIX NUMBER	SERIAL NUMBER

Certifier Date Signed

Company Certified on: Date

Exhibit C-11. WIPP Certification of Compliance

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No. | 2. Page 1 of | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address | A. State Manifest Document Number

4. Generator's Phone ( ) | B. State Generator's ID

5. Transporter 1 Company Name | 6. US EPA ID Number | C. State Transporter's ID | D. Transporter's Phone

7. Transporter 2 Company Name | 8. US EPA ID Number | E. State Transporter's ID | F. Transporter's Phone

9. Designated Facility Name and Site Address | 10. US EPA ID Number | G. State Facility's ID | H. Facility's Phone

GENERATOR

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.					
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above | K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name | Signature | Month Day Year

Style F15 REV-6 LABELMASTER, Div. of AMERICAN LABELMARK CO., CHICAGO, IL 60646 (800) 621-5808 EPA Form 8700-22 (Rev. 9-88) Previous editions are obsolete.

Exhibit C-12. Uniform Hazardous Waste Manifest

generator's certification statement that the waste is fully and accurately described, classified, packaged, labeled, and marked.

Upon actual receipt of the waste, the information for each container that was previously entered into the data base is cross-checked with the load list and corresponding shipping papers to verify accuracy. Any discrepancies are formally recorded and resolved with the generator.

When all data are verified, the containers of waste are labeled using a bar-code system that provides a unique identifier for each container which can be directly read by the automated system. Records of any movement, inspection, or handling of each container are maintained on the data base using this tracking system.

A revised data base is in development to improve the compilation and handling of waste-related data. This data base will enable access to all three existing data bases: RWMIS, TWDB, and TCWCIS. A record-by-record comparison is being performed within each data base and the results tabulated. The system will allow manipulation of the data to organize reports based on content codes, number and type of containers, and separation of TRU waste and low-level waste. This new data base will save time in searching for information within the three data bases and will also provide concise, accurate, and repeatable data numbers.

C-2 Chemical and Physical Analyses [IDAPA 16.01.5012,02 and 16.01.5008; 40 CFR 270.14(b)(2) and 264.13(a)]

Information on the chemical and physical compositions and forms of wastes managed at the ILTSF and the WSF is presented in this section. Wastes managed at these units include low-level radioactive (only) and low-level mixed (previously categorized as TRU as described on Page C-1), TRU radioactive (only), and TRU mixed. Of these four waste categories, only low-level mixed and TRU mixed are within the purview of RCRA, and this section consequently is

applicable to and addresses only those two waste categories. References to radioactive constituents are for information purposes only.

This section provides data on chemical and physical characteristics of wastes that are currently received for storage and data on wastes that are presently stored at ILTSF, the TSA earthen-covered pads, and the air-support storage buildings. As stated in the introduction to Section C, the air-support storage buildings on TSA-2 and TSA-3 will be closed under interim status. The TSA earthen-covered pads (TSA-1/TSA-R and part of TSA-2) will be retrieved. The TSA-R Enclosure constructed for retrieval will be modified for storage; this unit, called the TSA-R Modification, will be permitted in a separate application. Wastes presently being stored in the above TSA units will be relocated to the WSF.

As discussed earlier in Section C, the presence of TRU nuclides and the associated radiation fields severely limit the amount of chemical sampling and analysis that can be safely performed by generators and by RWMC personnel. Consequently, the waste characterization program is highly dependent on generator-supplied process information. Verification of generator-supplied data has been an ongoing activity for the past 12 years. Activities conducted for waste verification include: (1) visits to generator sites, completion of questionnaires, review of records, and personnel interviews to confirm potential nonradiological hazards associated with the wastes; (2) waste sampling and gas generation studies involving more than 260 containers of waste to verify compliance with the WIPP WAC, to examine the adequacy of RTR, and to assess the adequacy of gas venting/filtering devices; (3) detailed characterization using waste shipment records, visits to generator sites, generator personnel interviews, reviewing generator records, and observing waste-generating processes to verify for each content code the waste form, the generation source of the waste, waste packaging and handling practices, waste container preparation, assay methods, and waste constituents; (4) examination of more than 17,000 containers in SWEPP as described in Section C-1d; and (5) return of more than 260 containers to the Rocky Flats Plant to be reopened in

a hot cell and visually examined for free liquids (presence and volume), sludges, particulate quantities, presence of pyrophoric or toxic or corrosive materials, correspondence of contents with previous documentation, and physical description of the waste form. The results from these studies have been documented and are maintained at the RWMC. Current requirements for waste characterization performed by generators and the verification procedures used by RWMC personnel to validate generator-furnished data are described in the INEL TRU WAC (see Section C-1a(1) and Appendix I) and the Waste Analysis Plan (see Section C-3).

The majority of the mixed waste presently stored at the TSA was generated off-site at other DOE-operated facilities. While some waste has originated from INEL operations, the majority of waste has been received from the Rocky Flats Plant in Colorado. Other sources of waste include the Mound Facility in Ohio, the Argonne National Laboratory (East) in Illinois, the Battelle Columbus Laboratory in Ohio, and the Bettis Atomic Power Laboratory in Pennsylvania.

The wastes accepted for storage at the units to be permitted are generally containerized solids. Descriptions of acceptable packagings are provided in Section C-1a(1), Section D-1a(2)(1), and Section D-1c(2)(1). Except for some overpacking done at the RWMC for corrective/remedial action purposes for compliance with the INEL TRU WAC, all wastes are packaged by the generators.

Restrictions on the physical forms and chemical compositions of wastes received for storage are detailed in Section C-1a of this permit application. In accordance with those restrictions, all newly generated wastes presently accepted for storage will contain less than 0.5 percent by volume residual free liquids. Some wastes accepted for storage in prior years exceeded this residual free-liquid criterion or were accepted prior to establishment of the current residual free-liquid criterion of 0.5 percent by volume. To date, over 17,000 containers have been examined at SWEPP. Approximately 26 percent

of the containers were found to have residual liquids present that totaled 7,474 gal. This represents 0.8 percent of the total waste volume examined.

The wastes received for storage are composed of a wide variety of materials. Constituents of wastes include concrete, steel, soil, lead, paper, metals, glass, solvents, oils, lumber, and assorted other materials. Particle size distributions and bulk densities of the wastes vary appreciably.

Hazardous chemical constituents of the wastes include acetone, carbon tetrachloride, isopropanol, methanol, methyl ethyl ketone, isobutyl ketone, 1,1,1-trichloroethane, cadmium, lead, mercury, chromium, beryllium, and others. Accordingly, wastes managed at the TSA have been assigned numerous EPA hazardous waste codes, including D006, D007, D008, D009, D018, D019, D021, D023, D024, D025, D026, D028, D039, D040, F001, F002, F003, F004, F039, and P015.

Some of the wastes contain absorbed or residual acids, caustics, flammable solvents, and hydrocarbons. As a result, several waste streams have been assigned the EPA hazardous waste codes D001 and/or D002.

Most of the wastes managed at the units to be permitted and the units to be closed are TRU waste. As defined in current DOE orders, TRU wastes have activities greater than 100 nCi/g of TRU nuclides. Transuranic elements known to be present in the wastes include certain isotopes of americium, neptunium, plutonium, and uranium.

Prior to 1982, wastes with activities greater than 10 nCi/g were defined by DOE as TRU wastes. Accordingly, the current inventory of waste at the TSA includes materials with activities between 10 and 100 nCi/g which were previously considered to be TRU but are now classified as low-level wastes.

Many of the wastes are strong beta-gamma emitters. Radiation levels at the surfaces of packages range as follows:

- RH wastes managed at ILTSF - greater than 200 mR/h.
- CH wastes managed at the WSF - 200 mR/h or less.

As described in Section C-1, each waste generator and shipping site that sends waste to the RWMC must adhere to the INEL TRU WAC provided as Appendix I to this application. This document establishes requirements for containers, packaging, labeling, fissile material content, and other conditions. The generators and shipping sites must also have a Waste Certification Program Plan (WCPP) to establish their procedures to ensure that the waste to be shipped meets current WAC requirements. The WCPP addresses methodologies, controls, and organizational responsibilities for certification of compliance with the acceptance criteria as well as compliance with waste packaging, shipping, and documentation requirements. The generator provides detailed information pertaining to the characteristics of the waste, the generating process, the hazardous materials present, and the radioactive materials present. Information provided by the generators is entered into the various data bases used by the RWMC to store data on waste characteristics and to track waste movements (refer to Section C-1e). The data bases presently are the most reliable and comprehensive sources of information on the chemical and physical nature of the mixed waste stored at the TSA.

The following typical waste forms, representing a cross section of previously generated and newly generated wastes, have been identified by DOE generators as potentially containing RCRA-regulated hazardous wastes:

- Cemented and Uncemented Aqueous Waste - Currently, all aqueous process wastes are treated by a precipitation process involving neutralization, precipitation, flocculation, clarification, filtration, and immobilization. This waste form consists of a wastewater treatment sludge that is precipitated at a pH of 10 to 12.

  The immobilization process involves solidification with Portland cement. Prior to 1984, this waste was not cemented. Wastes generated prior to 1984 exist today as damp solids. Some of these aqueous wastes contained sludges contaminated with organics. Alcohols and halogenated organics in the sludge are derived from the cleaning of

equipment and glassware and the degreasing of metal. Some aqueous process waste may also contain metals precipitated as hydroxides, such as cadmium and lead.

- Cemented and Uncemented Organic Waste - Organic waste containing oil and halogenated organic solvents is solidified using Envirostone® cement and an emulsifier. Prior to 1984, this waste form was solidified with calcium silicates and currently exists as a damp solid without free liquids. Organic waste consists of lathe coolants and degreasing solvents used in plutonium fabrication.

- Solidified Process and Laboratory Solids - This waste form consists of anion and cation resins and incinerator ash which are neutralized and immobilized with Portland cement, as well as organic acids immobilized with magnesia cement. Solvents in this waste are from plutonium recovery operations and research and development laboratories.

- Combustible Waste - This waste form is comprised of paper, Kimwipes®, and cloth (dry and damp); various plastics such as polyethylene and polyvinyl chloride; wood; and filters contaminated with trace quantities of halogenated organic solvents. These materials are generated in plutonium recovery and fabrication processes and analytical laboratories.

- Metal Waste - Lead, tantalum, stainless steel, and aluminum constitute the majority of this waste form. These metallic wastes include equipment, tools, crucibles, and molds. Residual halogenated organic solvents may also be found in this waste form.

- Filter Waste - This waste form consists of Ful-Flo (polypropylene) and HEPA filters as well as processed filter media. All exhaust streams from plutonium fabrication and recovery processes are filtered to prevent the release of particulates that may be radioactively contaminated. Portland cement is added to the filter wastes to absorb any residual liquid and neutralize residual acids.

- Inorganic Solid Waste - Materials such as firebrick, Oil-Dri®, concrete, and soil are included in this waste form. This waste is generated from the decontamination and decommissioning of plutonium recovery areas. Oil-Dri®, concrete, and soil may be contaminated with residual halogenated organic solvents.

- Leaded Rubber Waste - Leaded rubber, dry box gloves, and aprons are used throughout the plutonium processing areas. This waste form is presumed to contain lead at levels above the toxicity characteristic threshold per 40 CFR 261, although no analyses have been done to establish actual lead concentrations.

- Solid RH TRU Mixed Wastes - This waste contains mixtures of combustibles (e.g., paper, polyvinyl chloride, polypropylene, polyethylene, and neoprene) and noncombustibles (e.g., laboratory equipment, tools, and small electric motors) that were removed from the Alpha-Gamma Hot Cell Facility. High-efficiency particulate air (HEPA) filters from the ICPP are also present. Residual free liquid wastes are not associated with processes that generate RH TRU waste.

  Trace quantities of mercury, barium, chromium, and nickel have been reported in some of the sludges, although lead is considered the predominant constituent. No organic solvents have been reported for these wastes. Heavy metals are present in the filters. No corrosive, ignitable, or reactive characteristics have been reported.

- Sludge - This includes fuel sludges and process sludges that are solidified (e.g., cemented or microwaved). This waste will be a solid monolith and packaged in shielded canisters.

Most of the organic solvents in the waste described above are present in residual quantities from the cleaning of equipment, plastics, glassware, and filters. A major RCRA-regulated constituent in TRU mixed wastes at the RWMC is lead in glove box parts and in lead-lined gloves and aprons.

The wastes that are, or will be, stored in the units to be permitted have diverse chemical and physical characteristics. To simplify the management of waste characterization data, the operators of the RWMC have developed a system which groups waste streams of similar characteristics using "content codes." The content codes are unique alphanumeric identifiers that are assigned by the RWMC to all approved waste streams. Each waste stream has its own content code. The content codes are recorded in the data bases for each container.

Table C-2 is a summary of the mixed wastes currently stored or approved for receipt and storage at the TSA. Information summarized in Table C-2 was extracted from the TRU Waste Inventory. This summary includes a brief description of the nature and form of the waste, the waste storage location, approximate volume, and the RCRA waste codes that apply to the waste. An evaluation performed as part of the WIPP permitting process indicates that as

TABLE C-2. SUMMARY OF MIXED WASTE STORED AT THE TSA

WASTE TYPE	WASTE LOCATION	WASTE VOLUME ($M.^3$)	RCRA WASTE CODES
Precertified TRU Waste	TSA	5879.5	D001, D002, D006, D007, D008, D009, D018, D019, D021, D023, D024, D025, D026, D028, D039, D040, F001, F002, F003, F004, F039, P015
Pad A Retrieval Low-Level Waste	TSA	10.1	D001, P015
Unknown*	TSA	1300.0	D001, D002, D006, D007, D008, D009, D018, D019, D021, D023, D024, D025, D026, D028, D039, D040, F001, F002, F003, F004, F039, P015
Benelex, Plexiglass	TSA		D008, D019, D039, D040, F001
• LLW		67.0	
• TRU		34.0	
Concrete-Brick	TSA		D019, D021, D039, D040, F001, F002
• LLW		406.8	
• TRU		109.0	
Glove Box Gloves	TSA		D008, D019, D039, D040, F001, F002
• LLW		5.5	
• TRU		158.0	
Adsorbed Liquids	TSA		D002
• LLW		318.0	
• TRU		538.0	

*During the early SDA retrievals (1974-1977) wastes retrieved were grouped into this category and stored at the TSA. Once these wastes are retrieved from the TSA storage, the waste forms will be characterized per the waste analysis plan presented in this application.

TABLE C-2. SUMMARY OF MIXED WASTE STORED AT THE TSA (continued)

WASTE TYPE	WASTE LOCATION	WASTE VOLUME ($M.^3$)	RCRA WASTE CODES
Cemented Sludges	TSA		D006, D008, D019, D018, D021, D039, D040, F001, F002, F003
• LLW		286.0	
• TRU		295.0	
Filters	TSA		D019, D021, D039, D040, F001, F002
• LLW		1743.0	
• TRU		328.0	
Metals	TSA		D006, D008, D009, D019, D028, D039, D040, F001, F002, F003
• LLW		9920.0	
• TRU		9609.0	
Radioactive Sources	TSA		D006
• LLW		9.0	
• TRU		90.0	
Solidified, Cemented Sludges (RH)	ILTSF	3.0	D006, D007, D008, D009, D011, D018, D019, D021, D028, D036, D039, D040, F001, F002, F003, F004, P015
Combustibles	TSA		D008, D009, D019, D021, D039, D040, F001, F002, F003
• LLW		7245.0	
• TRU		9524.0	
Glass	TSA		D008, D019, D039, D040, F001, F002
• LLW		557.0	
• TRU		846.0	

TABLE C-2. SUMMARY OF MIXED WASTE STORED AT THE TSA (continued)

WASTE TYPE	WASTE LOCATION	WASTE VOLUME ($M.^3$)	RCRA WASTE CODES
Particulate	TSA		D019, D039, D040, F001, F002
• LLW		1001.0	
• TRU		740.0	
Radioactively Contaminated Lead	TSA		D008
• LLW		139.3	
Resins	TSA		D001, D008, F001
• LLW		10.0	
• TRU		79.0	
Salts	TSA		D028, F001
• LLW		19.0	
• TRU		19.0	
Uncemented Sludges	TSA		D001, D006, D008, F001, F002, F003
• LLW		2429.0	
• TRU		6583.0	
Other (Mercury, Fuel Samples)	TSA		D008, D009
• LLW		0.3000	
• TRU		3.000	
Miscellaneous (Paper, Metals)	TSA		D001, D002, D008, F002, F003
• LLW		2263.0	
• TRU		703.0	

much as 95 percent of the waste volume shipped to the RWMC from the Rocky Flats Plant potentially contains some RCRA-regulated hazardous materials.

C-3 Waste Analysis Plan [IDAPA 16.01.5012,02 and 16.01.5008; 40 CFR 270.14(b)(3) and 264.13(b)]

The Waste Analysis Plan, designed to promote safe waste management practices at the WSF and at the ILTSF, is described in this section of the application. The objectives of this Plan are: (1) to ensure safe handling and storage of all waste materials; (2) to establish uniform and comparable waste characterization requirements for all generators; (3) to verify that incoming waste materials are properly described in the accompanying documentation; (4) to ensure that sufficient waste characterization data are collected to support the eventual treatment or disposal of the wastes; and (5) to ensure that all information requirements specified in the INEL TRU WAC are met by generators. Because a significant portion of the waste is destined for WIPP, this Waste Analysis Plan has been formulated to also provide all of the characteristics data required under the WIPP Waste Analysis Plan (WAP).

It is important to note that the WSF will be used, and the ILTSF is used, to manage both radioactive (only) and mixed wastes. This Plan therefore contains requirements for both radiological and chemical constituent determinations. The radiological considerations of this Plan are not within the purview of RCRA and the Idaho Hazardous Waste Management Regulations and are not intended to become permit conditions but have been included in this application to provide a complete understanding of the waste analysis program.

DOE's long-standing policy, published in DOE Order 5480.11, is to keep human exposure to radiation as low as reasonably achievable (ALARA). To address ALARA considerations, this Waste Analysis Plan, similar to those developed at other DOE TSD facilities (e.g., WIPP and the Nevada Test Site), requires all waste analysis to be performed and documented by the generators. This strategy simultaneously minimizes personnel exposure to ionizing

radiation and provides sufficient waste characteristics data to safely transport, store, treat, and dispose of the waste materials.

Details of the Waste Analysis Plan are provided in the ensuing sections. Section C-3a contains a discussion of waste characterization data quality objectives. Waste Characterization Reports are described in Section C-3b. The details for analysis of mixed wastes to be stored in the WSF are provided in Section C-3c. The details for analysis of mixed wastes to be stored in the ILTSF are in Section C-3d. The details for analysis of wastes that may be generated at the WSF and the ILTSF are in Section C-3e. Procedures for screening incoming waste movements *and the waste verification program for newly generated CH waste from off-site generators* are described in Section C-3f. Waste analysis requirements pertaining to land disposal restrictions (LDRs) are presented in Section C-3g.

C-3a Data Quality Objectives

The objectives of the Waste Analysis Plan are outlined in the preceding section. In this section, the data quality objectives (DQOs) for all waste characteristics data developed in accordance with the Waste Analysis Plan are presented in qualitative and quantitative terms. The DQOs specified in this section are quantitative and qualitative statements of the uncertainty that DOE and the RWMC are willing to accept in the waste characteristics data. The DQOs apply to all waste characteristics data whether based on process knowledge or analytical testing.

The DQOs were developed using the EPA-approved process described in Data Quality Objectives for Remedial Response Activities Development Process. DQOs for generator-supplied data are specified in Section C-3a(1). DQOs for RWMC-supplied data are specified in Section C-3a(2). Specific DQO analytical levels are defined in Table C-3.

TABLE C-3. DQO ANALYTICAL LEVELS

ANALYTICAL LEVEL	DATA USES	DATA SOURCES	LIMITATIONS	DATA QUALITY
Level C (EPA Level I)	- Waste characterization	- Total organic/inorganic vapor detection using portable instruments - Field test kits	- Instruments respond to naturally occurring compounds	- If instruments are calibrated and data interpreted correctly can provide indication of contamination
Level B (EPA Level II)	- Waste characterization - Evaluating treatment/disposal alternatives - Engineering design	- Laboratory analyses by gas chromatography (GC), atomic absorption spectrophotometry (AA), and other conventional instruments. Health physics surveys using portable survey meters.	- Techniques/instruments limited mostly to volatiles, metals - Unable to identify specific isotopes in waste matrix	- Dependent on QA/QC steps employed - Data typically reported in concentration ranges
Level B (EPA Level III)	- Risk assessment - Waste characterization - Evaluating treatment/disposal alternatives - Engineering design	- Organics/inorganics using EPA procedures - RCRA characteristic tests - Container weighing, real-time radiography, neutron assay, health physics survey, and container integrity examination at the Stored Waste Examination Pilot Plant (SWEPP).	- Tentative identification in some cases - Unable to detect trace contaminants at low ppb concentrations	- Similar detection limits to EPA Contract Laboratory Program (CLP) - Less rigorous QA/QC than required under CLP
Level A (EPA Level IV)	- Waste characterization - Risk assessment - Evaluating treatment/disposal alternatives - Engineering design	- Hazardous Substance List determinations using gas chromatograph/mass spectrometer (GC/MS), AA, and inductively coupled plasma (ICP) instruments.	- Some time may be required for validation of data packages	- Goal is data of known quality - Rigorous QA/QC - Full adherence to CLP protocol

C-3a(1) DQOs for Generator-Supplied Data

Data furnished by generators must be of sufficient quality to ensure compliance with the INEL TRU WAC. The data will be used to properly identify wastes in accordance with regulatory requirements and to ensure safe operation of RWMC waste management units. All data must be, at a minimum, of Level B (EPA Level II or III) quality.

C-3a(2) DQOs for RWMC-Supplied Data

The RWMC quality assurance programs, described in Section C-3a(3), were written to ensure compliance with the INEL TRU WAC. The data will be used to properly identify wastes in accordance with regulatory requirements and to ensure safe operation of RWMC waste management units. All RWMC-supplied data will be of Level B (EPA Level II or III) quality.

C-3a(3) Quality Assurance Plans

Data quality objectives and other quality assurance (QA) objectives and procedures are documented in formal QA plans. In this section of the RWMC Part B permit application, requirements for generator and RWMC QA plans are presented. Exhibit C-13 presents the major components of the QA program and their relationship under the INEL TRU WAC.

Generator Waste Certification Program Plan (WCPP)

As indicated in the introduction to Section C of this application, waste generators are responsible for characterizing their wastes prior to shipment to the RWMC. To ensure that this responsibility is met uniformly across the generator community, each generator has a written WCPP covering all facets of the waste characterization activity. Each generator will be required to have a QA plan consistent with the requirements of NQA-1, DOE orders, and EPA QA guidance which will be available for review or audit at any time. The WCPP is

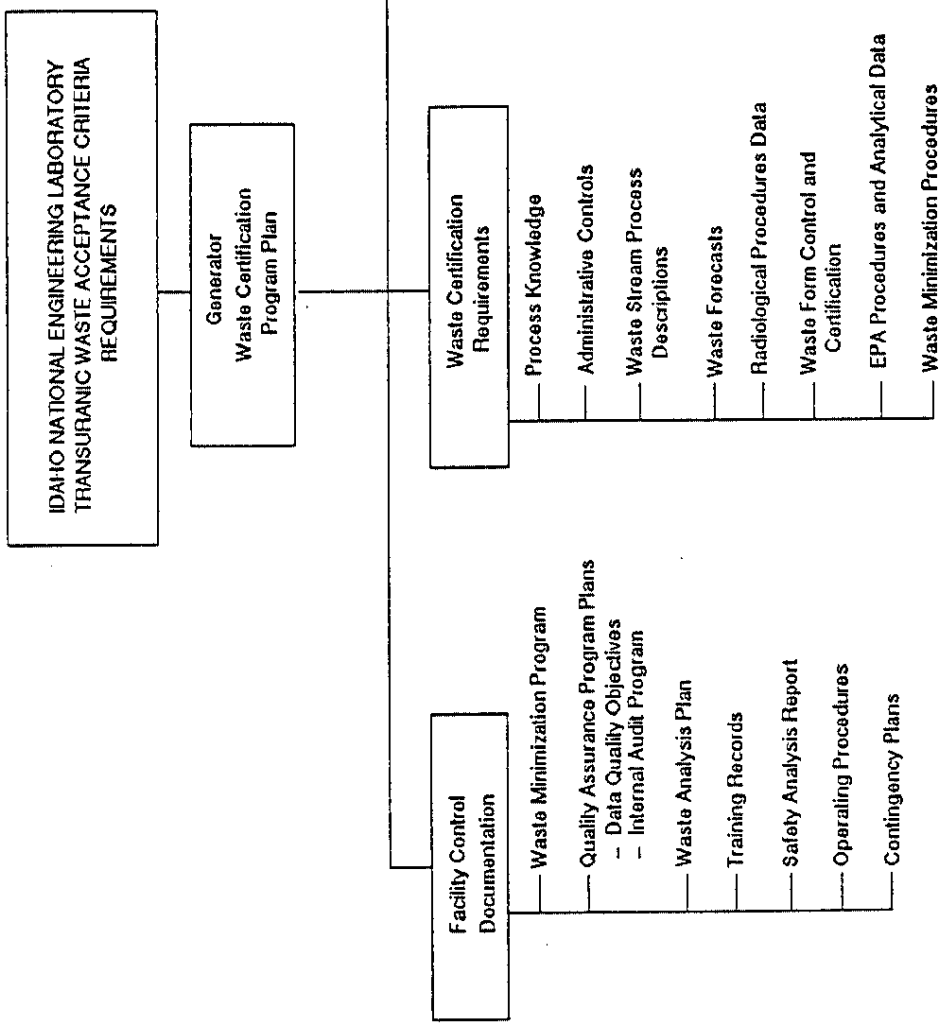

Exhibit C-13. INEL TRU WAC Requirements

submitted by the generator to the RWMC for review and approval before any wastes are shipped to the RWMC.

The WCPP presents, in specific terms, the policies, organization, objectives, functional activities, and specific QA and QC activities the generator will implement to achieve the DQOs described above in Section C-3a(1). At a minimum, the WCPP addresses each of the 13 items listed below:

1. Title page with provision for approval signatures.
2. Table of contents.
3. Purpose and scope.
4. Organization and responsibilities.
5. DQOs to define the type and quality of data needed to support the certification process.
6. Waste characterization including process knowledge, sampling, sampling custody, analytical procedures, and data qualification.
7. Facilities, equipment, and materials used to meet specific WAC requirements including design, control, and maintenance, as appropriate.
8. Packaging, handling, storage, and shipping.
9. Inspection including internal quality control checks and frequency.
10. Corrective action.
11. Procedures for waste generation, segregation, treatment, characterization, packaging, shipping, and certification.
12. Records retention.
13. Reports to management.

These are described in more detail in Section 1 of Part B of the INEL TRU WAC (Appendix I to this application).

The WCPP must be reviewed, amended, and resubmitted by the generator to the RWMC for review and approval annually, or whenever any of the 13 elements of the plan listed above are amended.

RWMC Quality Assurance Plan

The QA program for the RWMC is implemented under project directives, and the requirements for the program are detailed in the RWMC Quality Program Plan (QPP). The requirements for this document are mandated by DOE. The RWMC QPP is in accordance with NQA-1, the EG&G Quality Manual, and the Quality Assurance Requirements for Certification of TRU Waste for Shipment to the WIPP.

The QPP encompasses all operations at the RWMC and documents the specific activities and procedures that are conducted and used to assure and control the quality of RWMC facilities, waste management practices, and documentation. Elements of the QPP that are directly related to waste analysis and characterization include the following:

- Document control
- Control of processes
- Inspection
- Test control
- Control of measuring and test equipment
- Control of nonconforming items
- Corrective actions
- Computer software configuration management.

Activities/systems whose failure could cause undue risk to employees or public health and safety are classified as Quality Level A under the EG&G Quality Manual. Support activities/systems that affect data gathering or support routine facility operations are classified as Quality Level B (EPA Level II). Activities and facility systems at the RWMC have been evaluated

for proper quality level classification. Results of these evaluations are documented at the RWMC in operations documentation.

C-3b Waste Characterization Reports

Before any new waste is shipped to the RWMC, a Waste Characterization Report must be prepared by the generator and approved by the RWMC. The requirements and format for the Waste Characterization Report are contained in Section 1.3 of Part B of the INEL TRU WAC (see Appendix I). Procedures for preparing, reviewing, and verifying the Waste Characterization Report, as condensed from the INEL TRU WAC, are presented in this section. Waste characterization reports must be reviewed, amended, and resubmitted to the RWMC for review and approval under the following circumstances:

- At least annually
- For new waste streams
- Whenever the generating process is modified in a manner that materially impacts the waste stream.

See Part B of the INEL TRU WAC (Appendix I to this application) for additional details.

C-3b(1) Preparation by Generators

All waste generators are required to file a Waste Characterization Report with the RWMC WGI for each waste stream or waste package to be shipped to the RWMC. This report must be completed and signed by the waste generator and be approved by the RWMC prior to shipment of any waste not previously approved.

The Waste Characterization Reports are designed to provide assurances that the wastes comply with all applicable provisions of the INEL TRU WAC. The required Waste Characterization Report format is provided and described in Section 1.3 of Part B of the INEL TRU WAC (Appendix I to this application).

The Waste Characterization Reports are the primary means by which generators communicate data on the generating process; the chemical composition, physical description, radiological characteristics, thermal power, and isotopic content of the waste; packaging, handling, and storage; and listed constituents, hazardous characteristics, and other critical waste characteristics to the RWMC personnel involved in waste stream approval.

In completing the Waste Characterization Report, waste generators are required to use the results of any analytical tests and/or process knowledge, provided these data meet the DQOs established in the applicable WCPP and as described in Section C-3a.

C-3b(2) Review of Waste Characterization Report By RWMC

The WGI conducts a two-phase evaluation of the Waste Characterization Report. In Phase One, the report is inspected for completeness. This inspection involves comparing the generator's report to the format specified in the INEL TRU WAC. During this comparison, the WGI verifies that all information requirements have been addressed and that, to the best of his/her knowledge, the information is true and accurate. If the report is found to be incomplete or if inaccuracies are suspected, the WGI notifies the generator verbally and/or in writing of the concern(s). The generator is, in such cases, required to revise the report to address the concern(s) or provide written responses which effectively resolve the WGI's concern(s).

Once the WGI deems the Waste Characterization Report complete, the Phase Two evaluation commences. In Phase Two, the WGI and other cognizant waste management professionals review the information provided in the report for conformance to the TSA acceptance boundary conditions. These boundary conditions, which include the INEL TRU WAC and other requirements imposed by DOE-ID, are summarized in Table C-4. For additional parameters, refer to Tables 1 and 2 in Part A of the INEL TRU WAC (Appendix I of this application).

TABLE C-4. WASTE ACCEPTANCE BOUNDARY CONDITIONS FOR NEWLY GENERATED WASTE

PARAMETERS	BOUNDARY CONDITIONS
Free-liquids content	May not exceed *1* percent by volume
Particle size	Must be stabilized or immobilized. Particulates below 10 microns that are 1 percent or more of the waste volume or particulates below 200 microns that are 15 percent or greater of the waste volume are prohibited.
Explosives and Compressed Gases	None allowed.
Radioactive Pyrophoric Materials	May not exceed 1 percent by weight of the waste matrix.
Specific Activity	Must be greater than 100 nCi/g.
Fissile Material Content	Waste may not exceed the following Pu-239 fissile gram equivalent values: • 200 grams per 55-gal. drum • 100 grams per 30-gal. drum • 500 grams per DOT 6M container • 5 grams per cubic foot (177 g/m.^{3}) in other containers, up to 325 grams maximum.
Radiation at Package Surface	CH waste - may not exceed 200 mR/h. RH waste - may not exceed 1000 R/h.
Surface Contamination	Must be less than 100 dpm/100 cm.^{2} alpha and 1000 dpm/100 cm.^{2} beta-gamma.
Thermal Power	May not exceed 300 watts per package of RH waste. May not exceed 0.1 watts/ft.^{3} (3.5 w/m.^{3}) of CH waste.

TABLE C-4. WASTE ACCEPTANCE BOUNDARY CONDITIONS FOR NEWLY GENERATED WASTE (continued)

PARAMETERS	BOUNDARY CONDITIONS
PCBs	Prohibited from acceptance for storage at the WSF and ILTSF.
Phenolics	Prohibited from acceptance for storage at the WSF and ILTSF.
Chelating Agents	Prohibited from acceptance for storage at the WSF and ILTSF except as residue material.
Pathogenic or Infectious Wastes	Prohibited from acceptance for storage at the WSF and ILTSF.
Container Type	Must be DOT Type A packaging.
Container Venting	Must be vented.
RCRA Ignitable or Corrosive Waste	Prohibited from acceptance for storage at ILTSF.
RCRA Reactive Waste	Prohibited from acceptance for storage at the WSF and ILTSF.

NOTE: The boundary conditions provided in this table apply only to newly generated wastes. Nonconforming newly generated wastes are subject to rejection by the RWMC. Some wastes in the existing TSA inventory may not meet all of the boundary conditions. Nonconforming wastes already in the TSA inventory will be managed using special procedures (refer to Appendix II).

If information in the report deviates from the boundary conditions, the WGI issues a letter identifying the deviant condition and the intent to deny authorization for shipment until deviant conditions are resolved.

Conversely, if the WGI and other cognizant waste management professionals determine that the information in the report meets all boundary conditions, the generator is notified by the WGI in writing of the intent to conduct an audit/inspection of the generator's facilities as a condition of allowing shipment of the waste package or waste stream to the RWMC. The audit/inspection procedures are detailed in the following section.

C-3b(3) Verification Audits/Inspections of Generator Facilities

An on-site evaluation of the generator's facility, waste operations, and documentation will be conducted by RWMC personnel after receipt of the generator's Waste Characterization Report for each new waste or waste requiring recertification. This on-site evaluation will be conducted before any waste is shipped by the generator to the RWMC for storage at either the WSF or the ILTSF. On-site evaluations will be repeated each time a generator modifies the specific waste stream addressed, or at least annually. In some cases, the scope of the evaluation may be extended to facilities operated by the generator's subcontractors (i.e., analytical laboratories and packaging manufacturers).

The focus of the on-site evaluation is to assess the degree of conformance of waste characterization, packaging, and documentation to requirements established in the generator's WCPP and Waste Characterization Reports, and to the INEL TRU WAC. On-site evaluations may include, but are not limited to, a complete review of facilities, staff, training, instrumentation, standard operating procedures (SOPs), sampling and analysis methods, waste packaging methods, waste handling and storage methods, and QA programs and policies.

The on-site evaluation will be a four-phase series of audits and inspections, as described below.

Overview and Orientation

The RWMC representative will meet with generator facility management and other appropriate personnel. The objectives of the evaluation will be reviewed and a schedule will be established. The RWMC representative will also brief the generator's personnel on the results of the RWMC's reviews of the Waste Characterization Report.

Audits and Inspections

In accordance with the schedule, the RWMC representative will, at a minimum, perform the following tasks:

- Review records of waste stream characterizations based on "process knowledge." This will involve evaluations of piping and instrument diagrams, process descriptions, process specifications, and raw material and product records.
- Witness the sampling and analysis of wastes that are characterized on the basis of laboratory analytical data.
- Witness waste packaging, labeling, storage, and transportation processes. In the case of RH wastes, the packaging procedure may be videotaped.
- Examine waste analysis records, waste inventory records, staff training records, and QC records including logbooks, calibration and maintenance records, control charts, laboratory bench sheets, and corrective action reports.
- Interview generator personnel to gauge the adequacy of the generator's waste-related training programs and to determine compliance with RWMC requirements.

Findings

The RWMC representative will conduct an exit interview with the generator's personnel. The RWMC representative will briefly summarize the findings of the audits/inspections and will make recommendations regarding corrective actions. A written report on the findings will be transmitted to the generator by the RWMC within ten working days of the completion of the inspection. Copies of these reports will be maintained on file at the RWMC.

Corrective Action

In response to the RWMC representative's report, the generator will submit a plan to the RWMC to correct all deficiencies identified by the RWMC representative. The plan will include, for each deficiency, a description of the corrective action and a date indicating when the action will be implemented and completed.

As deemed necessary by the RWMC representative, a repeat on-site evaluation may be conducted to verify that corrective actions have been completed.

C-3c Waste Analysis Plan for Newly Generated Wastes to be Placed in the WSF [IDAPA 16.01.5012,02 and 16.01.5008,09; 40 CFR 270.14(b)(3), 264.13(b) and (c)]

The WSF will receive newly generated CH wastes from on-site and off-site sources. The basic waste analysis requirements applicable to all wastes destined for interim storage in the Type I and Type II modules are specified in the INEL TRU WAC (refer to Appendix I). The analytical parameters and rationale for their selection, as outlined in the INEL TRU WAC, are summarized in Section C-3c(1). Required test methods are specified in Section C-3c(2). Sampling methods to be used by all generators are described in Section C-3c(3). Sampling frequencies are provided in Section C-3c(4).

C-3c(1) Parameters and Rationale [IDAPA 16.01.5008,09; 40 CFR 264.13(b)(1)]

Waste analysis parameters for all newly generated wastes to be managed at the WSF, as specified in the Waste Characterization Report format (refer to Section C-3b), are listed in Table C-5. This table also summarizes the rationale for selecting the various parameters.

C-3c(2) Test Methods [IDAPA 16.01.5008,09; 40 CFR 264.13(b)(2)]

Table C-6 lists the test methods that generators will use to perform the analyses stipulated in Section C-3c(1). To the extent possible, all analytical test methods will be those specified in EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented by the generator and provided to the RWMC.

All testing will be performed by chemists and HP technicians working under approved QA guidelines. Applicable QA guidelines and DQOs are described in Section C-3a(1).

C-3c(3) Sampling Methods [IDAPA 16.01.5008,09 and 16.01.5005,01; 40 CFR 264.13(b)(3) and 40 CFR 261, Appendix I]

The TRU mixed wastes stored at the TSA exhibit substantial variations in physical characteristics. Some of the wastes are contiguous solids. Others are friable and soil-like. Some wastes are homogeneous, while others are stratified or heterogeneous.

Due to the physical variations discussed above, sampling methodologies will differ among the waste streams. The sampling methods and equipment

TABLE C-5. ANALYTICAL PARAMETERS FOR WSF AND ILTSF NEWLY GENERATED WASTE AND RATIONALE FOR SELECTION

PARAMETERS	RATIONALE FOR SELECTION
Physical State	INEL TRU WAC place restrictions on powders, ashes, and fine particulates.
Free Liquids	Free liquids in excess of *1* percent of container volume are prohibited for newly generated wastes.
Ignitability	Ignitable wastes require segregation and special handling. RCRA ignitable waste is prohibited from storage at the ILTSF. Information needed to determine if waste is characteristically hazardous under RCRA.
Corrosivity	Corrosive wastes require segregation and special handling. RCRA corrosive waste is prohibited from storage at the ILTSF. Information needed to determine if waste is characteristically hazardous under RCRA.
Reactivity	RCRA reactive waste is prohibited from storage at the WSF and ILTSF. Information needed to determine if waste is characteristically hazardous under RCRA.
Thermal Power	Wastes with high thermal powers require special packaging and storage procedures.
Other Hazardous Characteristics (pyrophoric, water reactive, chemically unstable, shock sensitive, explosive, cyanide- or sulfide-bearing)	Require special handling and segregation. INEL TRU WAC place limits on pyrophoric, unstable, and reactive wastes.
Radiological Data - Surface Dose Rate - Dose Rate at 3 ft. - Isotopes and curie quantity or grams	Ensures compliance with the contamination control limits and the INEL TRU WAC.

TABLE C-5. ANALYTICAL PARAMETERS FOR WSF AND ILTSF NEWLY GENERATED WASTE AND RATIONALE FOR SELECTION (Continued)

PARAMETERS	RATIONALE FOR SELECTION
- Removable Contamination Levels - Specific Activity - Pu-239 Equivalent Activity	
Toxicity Characteristic Toxicants	Determine if waste is regulated under RCRA. Determine toxicity and land disposal restrictions associated with the waste.
RCRA Listed Wastes/ Waste Constituents	Many wastes stored at the WSF contain listed wastes and their constituents. This listed waste parameter facilitates proper classification of the waste under RCRA and determinations of land disposal restrictions applicability. Materials may present a health hazard if released from the waste package.
Organic Materials (weight and percent by volume)	Information required for compliance with WIPP WAC. Materials may present a health hazard if released from the waste package.
Other Regulated Materials	Materials may present a health hazard if released from the waste package.

TABLE C-5. ANALYTICAL PARAMETERS FOR WSF AND ILTSF NEWLY GENERATED WASTE AND RATIONALE FOR SELECTION (Continued)

PARAMETERS	RATIONALE FOR SELECTION
Prohibited Materials - Phenolics - PCBs - Pressurized containers - Chelating and complexing agents, except as residue material - Spent fuel - Pathogenic waste - Non-radioactive materials - Unpackaged waste materials - Radioactive gas - Classified waste - Greater-than-Class C waste (NRC) - Low-level waste - Spent fuel - High-level waste - Explosives - Toxic gases, vapors, or fumes	Ensures that prohibited materials are not received for storage at the WSF or the ILTSF.

NOTE: Requirements listed in this table apply to newly generated wastes only.

TABLE C-6. WSF AND ILTSF WASTE TEST METHODS

PARAMETER	TEST METHODS
Physical State	Process Knowledge
Free Liquids	Process Knowledge, 9095*, or SWEPP Real-Time Radiography
Ignitability	Process Knowledge or 1010*
Corrosivity	Process Knowledge or 9040*
Reactivity	Process Knowledge or Section 7.3*
Thermal Power	Calculated
Other Hazardous Characteristics	Process Knowledge or EPA-approved analytical test methods*
Radiological Data	
- Surface Dose Rate	Geiger-Mueller and/or ion chamber
- Dose Rate at 3 ft.	Geiger-Mueller and/or ion chamber
- Isotopes, Curie Quantity, Grams	Container Assay
- Removable Contamination Levels	Swipe sampling and alpha-beta low background counting
- Specific Activity	Container Assay
- Pu-239 Equivalent Activity	Container Assay
Toxicity Characteristic	Process Knowledge or 1311* (Solids) and/or 6010*, 8020/8240*, 8010/8240*, 8080/8250*, 7470/7471*
RCRA Listed Wastes/ Waste Constituents	Process Knowledge or EPA-approved analytical test methods*
Organic Materials (weight and percent by volume)	Process Knowledge or EPA-approved analytical test methods*

TABLE C-6. WSF AND ILTSF WASTE TEST METHODS (continued)

PARAMETER	TEST METHODS
Other Regulated Materials	Process Knowledge or EPA-approved analytical test methods[a]
Prohibited Materials	Process Knowledge or EPA-approved analytical test methods[a]

a. U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented by the generator and provided to the RWMC.

potentially used by generators are too numerous to present. However, in all cases, the methods will adhere to guidance provided in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986, and other pertinent manuals published by EPA. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented by the generator and provided to the RWMC.

C-3c(4) Frequency of Analysis [IDAPA 16.01.5008,09; 40 CFR 264.13(b)(4)]

Waste generators characterize each waste stream at least annually. Waste streams are also analyzed whenever:

- A new waste stream is generated
- A process that generates a waste changes
- Waste characteristics exhibit variations over time
- *CH mixed wastes from off-site generators fail waste verification.*

Audits of each generator's waste characterization program will be conducted annually. This program is described in Section C-3b(3).

C-3d Waste Analysis Plan for Newly Generated Wastes to be Placed in the ILTSF [IDAPA 16.01.5012,12 and 16.01.5008,09; 40 CFR 270.14(b)(3), 264.13(b) and (c)]

The ILTSF will receive RH mixed wastes from on-site and off-site sources. The basic waste analysis requirements for ILTSF-destined wastes are outlined in the INEL TRU WAC (see Appendix I). Waste analysis parameters, rationale, test methods, and frequencies are the same as those required for the WSF (refer to Section C-3c and Tables C-5 and C-6). Wastes prohibited from storage at the ILTSF are RCRA ignitable, corrosive, or reactive wastes. Also prohibited are wastes with residual free liquids greater than *1* percent.

Analytical test methods will be those specified in EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986. As noted for the WSF, analytical methods may require modification on a case-by-case basis to accommodate any special handling or analytical problems associated with the radioactivity of the waste. As noted in Section C-3c(2), all modifications will be documented.

RH mixed wastes to be emplaced in the ILTSF will be videotaped as they are packaged and placed in containers inside a hot cell at the generator facility, before being shipped to the RWMC to provide additional records on the waste, if necessary.

All testing will be performed by chemists and HP technicians working under approved QA guidelines. Applicable QA guidelines and DQOs are described in Section C-3a(1). Videotapes will clearly indicate the physical form, color, and other important visible characteristics of all waste materials placed in containers.

C-3e Waste Analysis Plan for Waste Generated at the WSF and ILTSF
[IDAPA 16.01.5012,02 and 16.01.5008,09; 40 CFR 270.14(b)(3), 264.13(b) and (c)]

Transportation accidents, container failures, or other incidents could result in releases of waste materials at the WSF or ILTSF. In all such cases, the composition of the material will be known and will be documented, as described in Section C-1e. The released material will be collected and containerized. Recovered waste and clean-up residues will be characterized using the existing information on the source container. Similarly, contaminated solid wastes generated through contact with released containerized wastes will be containerized and characterized using existing information on the original waste.

During normal operations of the WSF and the ILTSF, it is possible that liquids resulting from condensation, precipitation, or plumbing leaks could accumulate in and around the units. RWMC personnel, immediately upon discovering accumulated liquids, will attempt to collect and analyze samples of the liquids in accordance with the procedures outlined in this section and the RWMC Emergency Plan/RCRA Contingency Plan (RWMC EP/RCRA CP) in Section G of this application. Radiation survey meters may first be used to assess the radiological character of the liquid to determine appropriate protective measures and sample collection methods. Liquids may be absorbed and containerized prior to characterization.

The following sections identify the analysis parameters and rationale for their selection, the test methods, and the sampling methods to be used to characterize liquid wastes that may be generated at the units to be permitted.

C-3e(1) Parameters and Rationale [IDAPA 16.01.5008,09; 40 CFR 264.13(b)(1)]

To determine the category of any collected liquids (i.e., noncontaminated liquid waste, low-level liquid waste, low-level mixed liquid waste, TRU liquid waste, TRU mixed liquid waste) and to ensure that such liquids are managed safely, the area will first undergo a radiation survey using portable survey instruments and then samples will be collected and analyzed for an extensive list of waste constituents. The list of parameters and the rationale for their selection are presented in Table C-7.

At the ILTSF, the mixed wastes stored will not be ignitable, reactive, or corrosive. The ILTSF-specific chemical parameters are noted by an asterisk on Table C-7.

TABLE C-7. ANALYTICAL PARAMETERS FOR COLLECTED LIQUIDS AND RATIONALE FOR THEIR SELECTION

PARAMETERS	RATIONALE
Surface Dose Rate	Determine whether gross quantities of radioactive waste constituents are present in the liquid. Determine radiological safety requirements for proceeding with clean-up.
Headspace Volatile Organics	Determine whether volatile hazardous waste constituents are present in the liquid.
pH	Determine whether the liquid is corrosive per 40 CFR 261.
Radiological - Surface Dose Rate - Dose Rate at 3 ft. - Isotopes, Curie quantity, Grams - Pu-239 Equivalent Activity	Verify/refute the presence of radioactive waste constituents in the liquid. Allow proper waste categorization. Ensure compliance with RWMC contamination control limits.
Hazardous Chemical Constituents (if headspace and/or pH samples are positive) - Volatile Organics* - Semivolatile Organics* - Toxicity Characteristic Metals*	Verify/refute the presence of regulated hazardous waste constituents in the liquid. Allow proper waste categorization. Provide adequate characterization for subsequent collection, storage, treatment, or disposal.
Other Parameters (if headspace and/or pH samples are positive) - Ignitability	Identify special waste handling and segregation requirements. Allow proper waste categorization. Provide adequate characterization for subsequent collection, storage, treatment, or disposal.

*ILTSF parameters.

C-3e(2) Test Methods [IDAPA 16.01.5008,09; 40 CFR 264.13(b)(2)]

Table C-8 provides the specific test methods that will be used for the analyses stipulated in Section C-3e(1). To the extent possible, test methods will be those specified in EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986, and Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-80-032, August 1980. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented.

All testing will be performed by chemists and HP technicians working under approved QA guidelines. Applicable QA guidelines are described in Section C-3a(3).

C-3e(3) Sampling Methods [IDAPA 16.01.5008,09 and 16.01.5005,01
40 CFR 264.13(b)(3) and 261, Appendix I]

Liquids to be sampled will be primarily single-phase, aqueous solutions. Sample collection methods described in Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, EPA-600/4-84-076, 2nd edition, will be used. Liquid samples for laboratory analysis will be collected for the following parameters: headspace volatile organics, volatile organics, semivolatile organics, metals, ignitability, corrosivity, reactivity, and isotopes. For ILTSF, analysis will be completed for metals, volatile organics, semi-volatile organics, and isotopes. Other determinations (surface dose rate, dose rate at 3 ft., specific activity, and Pu-239 equivalent activity) will be made on the material (once it is containerized) using portable survey meters or systems at SWEPP.

TABLE C-8. COLLECTED LIQUIDS TEST METHODS

PARAMETERS	SAMPLE ANALYSIS METHOD
Surface Dose Rate	Geiger-Mueller and/or ion chamber
Headspace Volatile Organics	Photoionization Detector, Flame Ionization Detector, Organic Vapor Analyzer
pH	9040[a]
Radiological	
- Dose Rate at 3 ft.	Geiger-Mueller and/or ion chamber
- Isotopes, Curies Quantity, Grams	Alpha and Beta-Gamma Spectroscopy
- Pu-239 Equivalent Activity	Container Assay at SWEPP or calculation
Hazardous Chemical Constituents	
- Volatile Organics	8240[a]
- Semivolatile Organics	8270[a]
- Toxicity Characteristic Metals	1311 (Extraction)[a], 6010[a] and 7470[a] (Determination)
Other Parameters	
- Ignitability	1010[a]

a. U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented.

The basic liquid sampling procedure will be as follows:

1. Obtain grab samples by slowly submerging the precleaned sampler.
2. Retrieve the sampler from the liquid with minimal disturbance.
3. Fill sample containers in the following sequence: headspace volatile organics, volatile organics, semivolatile organics, metals, ignitability, pH (corrosivity), reactivity, radiochemical parameters.
4. Label sample containers.
5. Properly clean and decontaminate sample containers and the sampling hardware.
6. Custody-seal and blister wrap all sample containers, place wrapped containers in a leaktight polyethylene bag, and place samples in a durable ice-filled cooler for transport to the laboratory.
7. Complete the chain-of-custody and request-for-analysis forms.
8. Review all paperwork and enclose the forms in a leaktight, polyethylene bag taped to the underside of the cooler lid.
9. Seal and mark the coolers in accordance with U.S. Department of Transportation (DOT) requirements.
10. Transport coolers to the analytical laboratory.

For liquids in an ILTSF vault, the established liquid collection procedure will be used to remove the liquids (as described in Section D-1c). Under this procedure, liquids are removed using a portable pump at the land surface which removes the liquid via the tubing in place in the vault or by tubing placed down the vault. The liquid is collected in container(s) equipped with a HEPA filter. The liquid collected in the container can then be sampled.

The volume and number of samples to be collected will generally be small. A minimum of four samples initially will be collected from each location.

These four samples will then be analyzed for the parameters listed in Table C-7. The need for additional samples and the regulatory status of the samples will then be established as follows:

- Calculate the sample mean ($\bar{x}$) and variance (S^2).
- Estimate the number of total required samples [n(i)] using the equation

$$n(i) = \frac{(t_{n(i)-1})^2 (S^2)}{\bar{x} - x_t}$$

where $t_{n(i)-1}$ is the t-distribution critical value and x_t is the threshold value beyond which the waste is considered hazardous.

- Obtain n(i) samples and analyze.
- Repeat the above steps until $n(i) < n(i-1)$.
- Accounting for the confidence interval, $\bar{x} \pm (t_{n(i)})(S^2/n)$, compare the calculated constituent concentrations to the regulatory thresholds (x_t), to determine whether the parameters are present at regulated levels. Use a 90 percent confidence interval for this purpose.

For homogenous single-phase liquids, four samples generally will suffice and additional samples will not be required. However, in cases of multi-phased or highly variable liquids, n(i) may be greater than four.

Referring to Table C-7, note that all samples from the WSF will be analyzed for surface dose rate, headspace volatile organics, and pH. These analyses may be performed at the INEL laboratories or at an approved off-site laboratory. Results from these analyses will be used to determine the need for additional analyses as described below and as summarized in Table C-7. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented.

If the surface dose rate exceeds background in a statistically significant manner, samples will be analyzed for the suite of radiological parameters listed in Table C-7. If the headspace volatile organics mean exceeds 10 ppm or if the mean of the pH exceeds 12 or is below 2, the suite of hazardous chemical constituents parameters, ignitability, and reactivity analyses will be performed. The determination of the dose rate at 3 ft. will be made on the containerized liquid, following recovery.

All samples will be labeled with at least the following information:

- A unique alphanumeric identifier
- Date and time of collection
- Sample collector's name
- Preservatives used
- Analyses requested.

Immediately after collection, samples will be placed on ice or blue ice in durable coolers for transport to the laboratory. Before shipping, coolers will be tightly sealed with duct tape and will be custody-sealed along the front and back edges of the lids. Samples will be transported to INEL laboratories within 24 hours of collection via truck. Samples will be transported to off-site laboratories via overnight courier to assure delivery within 24 hours of sample collection. All sample collection, preparation, packaging, transportation, and analysis shall conform to the requirements of EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented.

During all sampling activities, strict compliance with HP, industrial hygiene, and safety standards is mandatory. Personnel will be required to wear eye, skin, and respiratory protection gear, as dictated by industrial

hygiene and HP personnel. Accidental personnel contact with waste material will be remedied immediately with decontamination procedures. The nature of the waste managed at the RWMC dictates the use of personnel dosimeters (thermoluminescent dosimeters and neutron detectors) and the issuance of work control documents to conduct sampling and analytical activities.

Sample collectors will be required to maintain a permanent log of sampling activities. The log entries will include the following: purpose of sampling; date and time of collection; sample number; sampling location; sampling methodology; container description; waste description (sludge, imbibed solvent, contaminated soil, etc.); description of generating process or originating waste; name and address of waste producer; name and address of field contact; number and volume of samples; list of suspected hazardous materials; field observations; field measurements (e.g., pH, percent lower explosive limit); destination and transporter; and signature of collector.

A chain-of-custody record will accompany samples at all times. The record will contain the sample number, date and time of collection, sample description, and signatures of the collector and all subsequent custodians. Upon disposal of the sample, the chain-of-custody record will be returned to the RWMC which will maintain it in a file per RCRA requirements.

Transportation of samples will be in accordance with the DOT and DOE requirements. Hazardous waste samples will be properly packaged, marked, and labeled. Shipping papers will be prepared as required by the DOT.

All equipment used to sample waste materials will be disposable or designed for easy decontamination. Contaminated disposable equipment will be managed as low-level waste. Cleanable equipment will be thoroughly decontaminated prior to reuse. Decontamination solutions will be managed as low-level (only), low-level mixed waste, TRU (only), or TRU mixed wastes as appropriate depending on the threshold contaminant levels exceeded in the sampled liquids.

Sample container selection is critical to sample quality. Considering waste compatibility, durability, volume, and analytical sensitivities, the containers listed in Table C-9 are specified for these efforts.

C-3f Screening of Incoming Waste Movements

All of the waste materials to be received at the WSF and ILTSF from off-site and on-site generators will contain radioactive substances. The radioactive content of the waste is known and verified through the waste certification and acceptance program described earlier in this application. The radioactivity of the waste is further confirmed during HP surveys conducted as part of waste receipt and acceptance. Nonradioactive waste is not accepted.

Because the wastes are radioactive, they are consequently packaged in accordance with the requirements of the INEL TRU WAC and 49 CFR 173 in a manner that:

- Ensures leak tightness and shielding of ionizing radiation.
- Provides for dissipation of decay heat.
- Reduces chemical and radiation hazards to RWMC personnel, transport personnel, and the general public to ALARA levels.

A fundamental tenet of safe radioactive waste handling is the maintenance of effective separation between the radiation emitter and humans. DOE policy, stated in DOE Order 5480.11, mandates the minimization of human exposure to radioactive material.

The RWMC implements DOE policy by forbidding the opening of waste packages. Therefore, sealed waste packages are not routinely opened for receiving inspection at the RWMC.

TABLE C-9. SAMPLE CONTAINER REQUIREMENTS

PARAMETERS	SAMPLE CONTAINER	PRESERVATION
Surface Dose Rate[a]	None	None
Headspace Volatile Organics	2-40 mL septum vials with Teflon® septa	Cool to 4°C
pH (Corrosivity)	250-mL polyethylene	Cool to 4°C
Isotopes, Pu-239 Equivalent Activity	1,000-mL glass or polyethylene	Cool to 4°C, HNO_3 to pH<2
Volatile Organics	2-40 mL septum vials with Teflon septa	Cool to 4°C
Semivolatile Organics	1000-mL amber glass with Teflon lined caps	Cool to 4°C
Toxicity Characteristic Metals	500-mL polyethylene	HNO_3 to pH<2
Ignitability	250-mL polyethylene	Cool to 4°C
Reactivity	250-mL polyethylene	Cool to 4°C

a. Dose rate at 3 ft. is determined for the containerized liquid using survey meters. No sample container is needed for this analysis.

The RWMC relies on the TRU Waste Certification Program and associated QA to ensure that the incoming waste materials meet INEL TRU WAC [refer to Sections C-1a(1) and C-3b] and that they are properly packaged, marked, labeled, manifested, and otherwise documented.

At the generator sites, QA measures include detailed, routine chemical and radiochemical analyses of waste materials, and limitation of material access to qualified personnel only. All generators are required to have written WCPPs addressing waste characterization. Requirements for the WCPPs are summarized in Section C-3a(3). Moreover, all TRU and TRU mixed wastes, due to their isotopic contents, are managed as strategic materials. Consequently, their generation, storage, transportation, and disposal are closely controlled. In addition, all TRU and TRU mixed shipments are monitored by a Facility Operations Representative (FOR) at each generator location. The FOR's responsibilities include verification of waste conformance to the INEL TRU WAC and inspection of packaging, marking, labeling, and shipping papers.

At the RWMC, waste shipments are monitored by the WGI, HP technicians, and other RWMC personnel. *Shipments of newly generated CH waste from off-site generators are subject to the waste verification program presented in Section C-3f(3)(b).* The packaging of RH mixed waste to be stored at ILTSF will be videotaped at the generator site to provide visual augmentation of waste characteristics data.

The DOE employs only DOT-licensed and DOE-approved carriers to transport radioactive wastes to the RWMC. All carriers are required by contract to comply with DOT regulations and DOE orders and guidelines.

To augment its confidence in the waste characterization, packaging, transportation, and documentation programs described above and to verify generator information, the RWMC screens all incoming waste movements. This screening program involves inspecting containers and labels, reviewing

manifests and shipping papers, "fingerprinting" wastes, and accepting/rejecting waste movements.

Details on incoming container inspections at the RWMC are described in Section C-3f(1). Procedures used by RWMC personnel to review manifests and shipping papers are described in Section C-3f(2). "Fingerprinting" activities are outlined in Section C-3f(3). Procedures used by the RWMC to accept or reject waste movements are described in Section C-3f(4).

C-3f(1) Inspection of Containers and Labels

To verify that waste packages are safe to handle, RWMC personnel survey incoming shipments and transport vehicles for radioactive contamination prior to unloading. The procedures are described in Section C-1b. The materials and equipment that are used during these surveys may include portable radiation detectors, contamination smears, hard hats, safety shoes, and safety glasses.

Prior to opening the sealed transporter doors, RWMC personnel inspect the uniform waste manifest, shipping papers, and other required documentation for completeness and accuracy. Refer to Section C-3f(2) for details.

Special care is taken during the opening of sealed transporter doors to verify that loads are stable. Once load stability has been ensured, the inspection proceeds as follows:

- Before and after container unloading, the transport vehicle and its cargo are scanned with portable, calibrated alpha and beta-gamma detectors.
- Dose rates at package surfaces and at distances of 1 m. are measured and recorded.
- Smear samples are collected from the exterior waste package and interior transporter surfaces for low background counting at the RWMC.

Measurements are compared with the contamination control limits of Table C-1 to determine acceptability.

- If smear samples indicate excessive external contamination, immediate overpacking or decontamination is performed.
- RWMC personnel visually inspect all packages for integrity. Breaches or irregularities are reported immediately to the RWMC Manager, who then specifies remedial actions.
- RWMC personnel inspect all markings and labels for completeness and accuracy. A cross-check against the manifest is made to verify that all packages are properly described and accounted for.
- Upon completion of off-loading, transport vehicles are monitored thoroughly with portable survey instruments. At least three smear samples are taken and counted prior to vehicle release.

The survey procedure detailed above indirectly ensures that all container surfaces are not contaminated with the hazardous chemical constituents of the mixed waste because radionuclides and chemicals are interstitially dispersed in all of the mixed waste handled at the RWMC. Hence, the detection of transferrable radioactive contamination indicates a potential for chemical contamination. Conversely, the absence of transferrable radioactive contamination implies no chemical contamination and confirms the RWMC's ability to safely handle and store the containers.

The QA program for survey instruments is outlined in Section C-3a(3) and in established procedures and protocols. The portable detectors and the low background counter are calibrated and maintained on a routine, scheduled basis. Calibration sources are traceable to the National Institute of Standards and Technology (NIST). Manufacturers' recommendations and written maintenance instructions are followed. Standard cleaning, lubrication, testing, and parts replacement techniques are used. A documented recall system is in place. Calibration and maintenance logs are kept current and are audited at least annually. Additional information on equipment calibration is included in Section F of this permit application.

All survey records are stored temporarily at the RWMC and are then sent to Records Storage.

C-3f(2) Review of Manifests and Shipping Papers

Prior to accepting any waste shipment, the RWMC thoroughly reviews all documentation associated with the shipment. For mixed waste shipments, this process involves checking the following documents for completeness and accuracy:

- The Uniform Hazardous Waste Manifest (refer to Exhibit C-12).
- Form ID F 5480.3A, "U.S. DOE Hazardous Material Shipping Record," (refer to Exhibit C-7) for each off-site shipment.
- Form ID F 5820.2A, "Certified Waste Data Base System Transuranic Waste Data Base Input Form," (refer to Exhibit C-9).
- INEL TRU WAC Compliance Certification Statement (refer to Exhibit C-10).
- WIPP WAC Compliance Statement (refer to Exhibit C-11) for each WIPP-certified waste container.
- Any LDR notifications and certifications (refer to Section C-3g).

In reviewing the manifest, the information listed below is checked for completeness and accuracy:

- Manifest document number
- Generator's name, address, and EPA ID number
- Each transporter's name and EPA ID number
- DOT shipping name and number
- Quantity/volume of waste in the shipment
- Number and type of containers
- Signed certification and date.

C-3f(3) "Fingerprinting" Waste Shipments

This section presents the "fingerprinting" procedures used at the RWMC to screen wastes from generators and stored wastes to be relocated from TSA-1/TSA-R, TSA-2, and TSA-3 to the WSF.

As the owner/operator of an off-site TSD facility, the DOE is required to:

- Document the waste analysis data furnished by the generators
- Specify procedures by which generators must characterize each waste shipment
- Specify procedures that will be used at the RWMC to assure consistency between the waste and the associated manifest and waste characterization data.

Procedures designed to meet the first two requirements above are provided in Section C-1e and the preceding portions of Section C-3. Procedures which satisfy the last requirement are provided below.

The measures described in the preceding sections of this application obviate the requirement for sampling and analyzing incoming waste shipments at the RWMC. First, the DOE quality and security programs, which all generators follow, ensure accurate waste characterizations and proper waste packaging, marking, labeling, and documentation. Second, transportation is provided in a quality- and security-controlled manner. Third, generators are required to certify compliance with the INEL TRU WAC. Finally, on-site evaluations of generators' facilities and receiving inspections conducted at the RWMC verify the work of the off-site and on-site DOE contractors and ensure safe waste management practices at the RWMC.

Nonetheless, the RWMC operators conduct routine, systematic examinations of incoming waste containers. Aside from the inspections outlined in

Section C-3f(1), RWMC personnel may also perform nondestructive examinations of CH waste containers using RTR, container assay, container integrity, HP monitoring, headspace analysis, and other techniques. These examinations are described below. RH wastes are not currently subjected to these examinations but may undergo nondestructive examination in the future to certify compliance with the applicable WAC for the facility which will eventually receive the waste. RCRA-regulated RH waste placed in containers at the generator's site will be videotaped during packaging as a record of the waste.

SWEPP Examinations

The SWEPP facility allows examination of a number of physical characteristics of the CH wastes received at the RWMC without violating the integrity of the container, while minimizing worker radiation exposure. The SWEPP remote examination program includes the following basic components:

- Health physics station
- Container weighing
- Real-time radiography
- Container assay
- Container integrity system.

The application of the SWEPP facility to the waste container examination process is fully described in Section C-1d.

Fingerprint Sampling and Analysis

The TSA at the RWMC has operated for over 20 years without a serious waste-related incident. Small waste releases have been managed and corrected in compliance with the RWMC EP/RCRA CP and its predecessor documents. The waste characterization data on wastes currently in the TSA inventory are sufficient to ensure safe operation of the WSF and the ILTSF throughout their operating lives. Accordingly, fingerprint sampling and analysis of wastes

currently in the TSA inventory are not needed to support continuing storage of waste at the TSA. Verification of newly generated waste is described in Sections C-3c *and C-3f(3)(b)* of this permit application.

Chemical constituent data on many of the previously generated wastes already in storage at the RWMC may, however, need additional quantification or verification to support eventual off-site treatment or disposal. Consequently, the procedures described in this section include a methodology for obtaining supplemental characterization information for wastes currently in storage prior to shipment to off-site TSD facilities (such as WIPP).

Wastes which will be placed from this time forward in the WSF and the ILTSF will have three primary sources:

- Existing inventories at the TSA-3 air-support building; the TSA-1, TSA-2, and TSA-R earthen-covered storage pads; and the TSA-2 air-support structure (WSF only)
- INEL generators (newly generated wastes)
- Off-site generators (newly generated wastes).

Fingerprinting procedures for each of these sources are described below.

C-3f(3)(a) Existing Inventories

The existing waste inventories are characterized for storage based on process knowledge supplied by the generators, headspace gas sampling performed on a portion of the waste, visual examination of a portion of the waste, and SWEPP verification of the waste form and packaging. The existing characterization is adequate for continued storage in the existing structures or the modules addressed in this permit application.

A number of the drums currently stored at TSA-3 are involved in the WIPP Bin Test Program activities at ANL-W, and will be rigorously re-examined to

provide data to certify compliance with the WIPP WAC and the requirements of the No Migration Petition Determination for WIPP to enable the waste to be shipped to WIPP. Secondarily, the data generated by the WIPP Bin Test Program will supplement the existing waste characterization data base. The details of this WIPP Bin Test Program are being developed by the DOE WIPP RCRA Interface Working Group. The program will be submitted to the regulatory community for review in the near future. Although details of the program are not defined at this time, it is known that the program will include the following elements:

- Re-examination of waste drums at SWEPP
- Visual inspection of wastes in an alpha cell at ANL-W
- Drum headspace gas sampling and analysis in an alpha cell at ANL-W and at a CFA laboratory.

These drums will be sampled and analyzed, in accordance with the WIPP Quality Assurance Project Plan (QAPP) and associated documents. Under the WIPP QAPP, waste will be randomly selected from the inventory in storage utilizing a random number-based selection process for examination at SWEPP.

The headspace sampling procedure will be as described below:

1. The drum will be moved inside an alpha containment cell.
2. The drum headspace gas will be sampled. One or two gas samples will be drawn from within the liner.
3. A gas sample will be drawn from each significant layer of waste packaging (i.e., bag) within a container with sufficient volume for a sample.
4. The drum contents will be visually inspected and weighed. To do this, the contents will be removed from the drum and placed in a pan-like work table. The contents will be described based on visual observation and weighed by operators, then placed into test bins. Test bins will be closed and leak tested.

Procedures to operate the sampling canister will be per manufacturers' operating instructions. The selection of analytical parameters for headspace vapor samples will be based on process knowledge. The parameters selected will be based on the generators' process knowledge and may include any or all of the following target compounds:

- Acetone
- Benzene
- Bromoform
- 1-Butanol
- 2-Butanone
- Carbon Tetrachloride
- Chlorobenzene
- Chloroform
- Cyclohexane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,2-Dichloroethene
- cis-1,2-Dichloroethene
- Ethyl Benzene
- Ethyl Ether
- Methanol
- Methylene Chloride
- 4-Methyl-2-pentanone
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethene
- Toluene
- 1,1,1-Trichloroethane
- Trichloroethene
- 1,1,2-Trichloro-1,2,2-trifluoroethane
- 1,3,5-Trimethylbenzene
- 1,2,4-Trimethylbenzene
- m-Xylene

- o-Xylene
- p-Xylene.

Waste that does not meet the WIPP WAC will ultimately be treated to generate a waste form and constituent levels that do comply and will enable waste acceptance at WIPP. Detailed procedures for sampling and analyzing such waste will be developed once appropriate treatment methods and facilities have been identified. They will be consistent with those described above.

C-3f(3)(b) Newly Generated Wastes from INEL and Off-Site Generators

INEL and off-site generators will be required to certify that all newly generated TRU wastes shipped to the RWMC meet the INEL TRU WAC. These certifications will be required under the TRU Waste Certification Program [refer to Section C-1a(2)]. Given the stringent characterization and certification requirements imposed on generators by the RWMC, a high degree of confidence in generator-furnished waste data will exist. Safe handling and storage of these wastes at the RWMC will be ensured. Consequently, no fingerprint sampling and analysis of newly-generated *CH mixed* wastes *from INEL generators* will be *required* at the RWMC.

Newly generated CH mixed wastes from off-site generators destined for storage at the WSF will undergo waste verification. Upon arrival at the RWMC, 5 percent of the containers in each shipment of CH mixed waste from off-site generators will be randomly selected to undergo the following:

- *Conduct RTR to verify waste form contents and percent free liquids present*
- *Obtain headspace gas sample and analyze gas sample for target organic compounds identified in Section C-3f(3)(a)*
- *Obtain core sample and analyze core sample for TCLP metals (sludges, resins, and salts only).*

The headspace gas sample will be obtained by pulling the sample across the filter installed on the container. A core sample will be obtained remotely by coring or a comparable methodology. The capability to obtain core samples is in development at this time at ANL-W WIPP Waste Characterization Facility and the RWMC Waste Characterization Facility. Samples will be analyzed using the methods identified in Table C-6.

The shipment will not be accepted and unloaded until waste verification results are received and substantiate the waste characterization data supplied by the off-site generator. If the waste verification data do not substantiate the waste characterization data supplied or the data indicate that the waste does not meet the requirements of the INEL TRU WAC or the waste analysis plan described in this permit application, the shipment will be rejected and returned to the off-site generator.

As noted in Section C-3d, RH mixed waste destined for storage at the ILTSF will be videotaped at the generator's site during packaging as a record of waste verification.

As off-site TSD facilities and the off-site TSD acceptance requirements are identified for newly generated wastes, additional waste characterization requirements may evolve. In such instances, waste characterization plans will be formulated and implemented to fulfill the new data needs.

C-3f(4) Procedures for Accepting or Rejecting Waste Shipments

The procedures for accepting/rejecting waste shipments at the RWMC are established in the procedures for receipt, inspection, and documentation of waste (described in Section C-1b). In accordance with these procedures, rigorous receiving inspections and examinations are performed and documented. Apparent noncompliances with the INEL TRU WAC, *fingerprinting results as described in Section C-3f(3)(b) (only for newly generated CH mixed waste from off-site generators)*, or other discrepancies are formally resolved with the

generator before any waste is accepted. Resolution may be verbal or written. *For off-site shipments, if* resolutions require 15 days or more, the RWMC Manager or his designee will notify DOE-ID, which, in turn, will submit a letter to the EPA Region X Administrator and the IDHW Administrator. In accordance with 40 CFR 264.72, the letter will describe the discrepancy and attempts to reconcile it. Copies of the manifest and other shipping papers will be included.

C-3g Waste Analysis Requirements Pertaining to Land Disposal Restrictions

The Hazardous and Solid Waste Amendments (HSWA) prohibit the land disposal of certain types of wastes that are subject to RCRA. Many of the mixed wastes managed at the RWMC fall within the purview of these LDRs. Information presented in this section describes how generators and the operators of the RWMC characterize, document, and certify the LDR-subject wastes.

On June 1, 1990, the EPA granted a two-year national capacity variance for certain mixed wastes. As a result, mixed wastes subject to the "third third" rulemaking were not subject to the LDR provisions until 1992. DOE Headquarters has submitted a case-by-case extension for the DOE complex to the U.S. EPA. The extension request was issued for public comment on May 7, 1992. Further, wastes in storage are intended to go to WIPP, which has a No Migration Petition Determination from the U.S. EPA to allow acceptance of land-disposal-restricted wastes. The No Migration Petition Determination is in effect through the year 2000.

Section C-3g(1) describes the methods used to characterize LDR-subject wastes. Section C-3g(2) describes sampling and analysis procedures. Section C-3g(3) details the frequency of waste characterizations. Section C-3g(4) describes documentation and certification procedures.

C-3g(1) Waste Characterization

For all newly generated wastes, the waste generators are required to document the level of toxicity characteristic toxicants in wastes shipped to the RWMC. This information, coupled with the other analytical requirements stipulated in the INEL TRU WAC, allows generators and RWMC to accurately make all LDR determinations.

C-3g(2) Sampling and Analytical Procedures

LDR wastes are sampled and analyzed using only EPA-approved methods, as stated in Section C-3c(3). Approved test methods are listed in Table C-6. Because of the radioactivity associated with the waste matrix, it may be necessary to modify EPA methods. All such modifications and their potential impacts on analytical results will be documented.

C-3g(3) Frequency of Analysis

All LDR wastes are characterized at least annually and whenever:

- A new waste stream is generated
- A generating process changes
- Waste characteristics exhibit temporal variations
- *CH mixed wastes from off-site generators fail waste verification.*

C-3g(4) Documentation and Certification

The WSF and the ILTSF will provide interim storage for mixed wastes eventually destined for disposal at WIPP or for treatment or disposal at other facilities yet to be determined. The ILTSF is presently receiving and storing wastes. The WSF is anticipated to be ready to receive wastes in the 1993-1994

timeframe. Storage at the WSF will continue beyond the expiration of the two-year national capacity variance.

Since waste treatment will not occur at the WSF or ILTSF, the DOE requires all waste generators to provide all notifications and certifications as mandated by 40 CFR 268.7. Accordingly, all generators of wastes that are subject to LDR or any LDR-related variances are required to submit to the RWMC all of the notifications and certifications described in 40 CFR 268.7.

In cases where a generator determines that an LDR waste does not meet the applicable treatment standards set forth in 40 CFR 268 Subpart D or exceeds the application prohibition levels set forth in 40 CFR 268.32 or Section 3004(d) of RCRA, the generator will provide the RWMC a written notice which will include the following information:

- EPA Hazardous Waste Number
- The corresponding treatment standards and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d)
- The manifest number associated with the waste
- All available waste analysis data.

In cases where a generator determines that a restricted waste is being managed that can be land disposed without further treatment, the generator will submit to the RWMC a written notice and certification stating that the waste meets applicable treatment standards set forth in 40 CFR 268 Subpart D and the applicable prohibition levels set forth in 40 CFR 268.32 or RCRA Section 3004(d). The notice will include the following information:

- EPA Hazardous Waste Number
- Corresponding treatment standards and applicable prohibitions
- Manifest number associated with the waste
- All available waste analysis data.

The certification accompanying any of the above-described notices will be signed by an authorized representative of the generator and will state the following:

> I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

Copies of all notices and certifications described above will be retained at the RWMC for at least five years from the date that the waste that is the subject of documentation was last sent to an on-site or off-site TSD facility, and then sent to Records Storage. Copies of all notices and certifications will also be provided to WIPP and other on-site and off-site TSD facilities with the eventual waste shipments to those facilities.